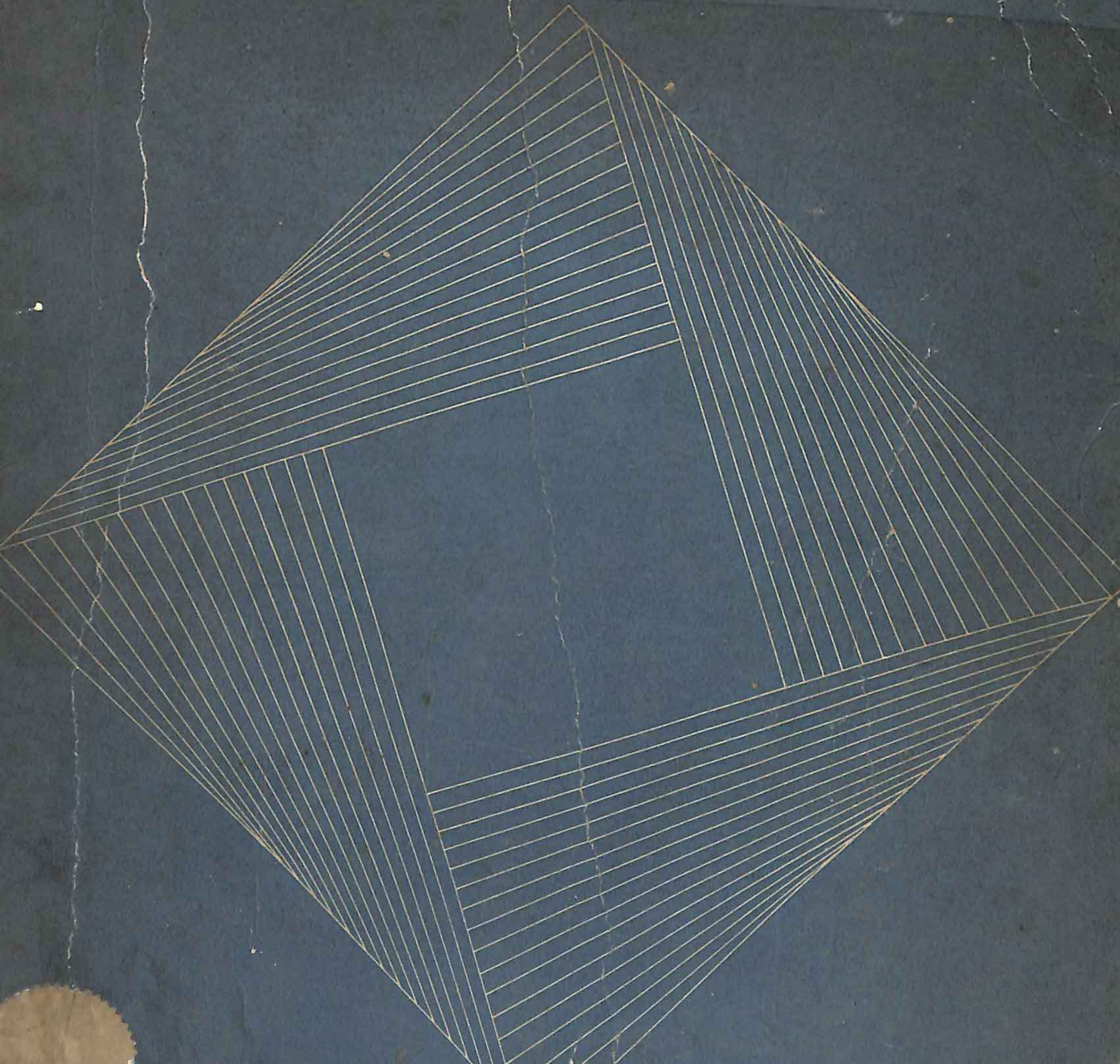
Educational planning in the USS



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To be published in 1968 Education and Economic and Social Planning in France

by Raymond Poignant

With observations of an IIEP mission to France headed by Georgi Skorov

Educational planning in the USSR

Study by

K. Nozhko
E. Monoszon
V. Zhamin
V. Severtsev

With observations of an IIEP mission to the USSR

headed by Raymond Poignant

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Unesco:
International Institute for Educational Planning

Published in 1968 by the United Nations
Educational, Scientific and Cultural Organization
Place de Fontenoy, 75 Paris-7e

Printed in France by Offset-Aubin, Poitiers

S.C.E.R.T., West Bengal
Date 15. 3. 69.
Acc. No. 2034

379.47
UNE

[illegible]
[illegible]
[illegible] 15.3.69
[illegible] 2034

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Composition and make-up by IIEP,
7 rue Eugène-Delacroix, 75 Paris-16^e
Cover design by Bruno Pfäffli

IIEP.67/D.3/A

Foreword

The constantly increasing importance of the problems involved in education and training, especially as factors in economic and social development, has led all countries - industralized or not - to intensify their efforts to develop their educational systems, and hence to organize them more logically by means of specific planning.

Unesco has quite naturally endeavoured to encourage, promote and accelerate national initiatives by giving a priority position in its programmes to the planning of educational development. That priority took definite form in the organization of the Department of Planning and Financing of Education as a part of the Unesco Secretariat for the purpose of providing direct assistance in that field to the Member States, by the creation of regional centres for the training of planners at Beirut, Dakar, New Delhi and Santiago, and finally by the establishment in Paris in 1963 of the International Institute for Educational Planning (IIEP),[1] an agency for study, research and training.

The IIEP study and research programme, started early in 1964, has developed in several directions. From the outset, however, the necessity became apparent of examining and making known the wealth of definite experience already acquired by those countries which were the first to undertake the establishment of plans for the development of their educational systems and especially those in which that effort was a part of their general economic and social planning. That is especially the case with the Soviet Union, whose first five-year plan goes back to the period 1928-32, inclusive, and whose eighth five-year plan (1966-70) is now being carried out. This case study is therefore devoted to the Soviet experience in planning its educational system.[2] It was prepared under the direction of Raymond Poignant, Senior Staff Member of IIEP.

The principles and procedures governing the execution of this project were determined in 1964 at meetings of Mr. Poignant and ourself with the leading authorities of the State Committee for Cultural Relations and the National Commission of the USSR for Unesco.

The core of this publication consists of a study prepared by a group of Soviet writers, the individual contributions being co-ordinated by K. Nozhko, following a plan which had been discussed with IIEP. The work of the Soviet group of writers has been supplemented by the observations of the mission of international experts, organized by IIEP and headed by Mr. Poignant, which visited the Soviet Union in September-October 1965.

The study by Soviet writers

This study deals with the experience acquired by the Soviet Union in planning the various sectors of its educational system (primary and secondary general, vocational and technical, secondary specialized, and higher education). The authors give special attention to analysing the methods which were used in working out the programme for educational development in the context of general economic planning and to an examination of the implementation of these plans within the framework of the planned economy of the Soviet Union.

Part One briefly reviews the general organization of education in the Soviet Union and the changes which have been made since the inception of the Soviet régime. It also explains the administrative organization of educational institutions of all kinds, from the primary schools to the universities.

Part Two is devoted to the experience acquired by the Soviets in the field of educational planning from the period of the first five-year plans up to the present time. This experience can undoubtedly be helpful to other countries, especially those which are entering on the pathway of a planned economy or which are already so engaged, in organizing the planning of their own educational systems in an efficient manner. That is the purpose which has guided the authors in explaining, in the fullest possible detail permitted by the restricted size of this work, the methods used in the preparation of the Soviet educational development plans, the standards on which the planning was based, and the reasons underlying the choices. They also give all useful information on the administrative organization of the planning and on the part played by the various agencies and institutions concerned, from the schools themselves to the State Planning Committee of the Council of Ministers of the USSR, known as the Gosplan,[1] which co-ordinated all the efforts.

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[1] IIEP was created with the initial assistance of the International Bank for Reconstruction and Development and the Ford Foundation, while the French government provides its headquarters in Paris.

[2] A similar case study has been undertaken by IIEP relating to France, whose experience although more recent, since the period 1966-70 corresponds only to its fifth plan, is none the less unique among western countries.

In accordance with the agreement concluded with the National Commission of the USSR for Unesco, the preparation of the study was entrusted to the following writers:

K. Nozhko, 'Candidate' in economic sciences[2]
  Introduction; Part Two, chapter 1 (Planning of national education and the balance-sheet of labour resources); chapter 3 (Planning of vocational-technical education); chapter 4 (Planning of higher and secondary specialized education); chapter 5 (Financing of education); chapter 6 (Prospects for the development of education).
E. Monoszon, Member of the Academy of Pedagogical Sciences of the USSR
  Part One, chapter 1 (Primary and secondary general education).
V. Zhamin, Doctor of economic sciences
  Part Two, chapter 2 (Planning of secondary general education).
V. Severtsev, 'Candidate' in philosophical sciences
  Part One, chapter 2 (Vocational-technical education); chapter 3 (Secondary specialized education); chapter 4 (Higher education).

As we have said, Mr. Nozhko has co-ordinated all the parts and edited the final text of the study.

Observations of the international mission

The organization of an international study mission by IIEP was decided on during the meetings in Moscow in 1964, to which we have referred. The mission had a twofold objective: (a) to enable a group of experts from four continents[3] to have direct contact with Soviet educational problems and thus to broaden the field of their own experience; (b) to make the undertaking, in so far as possible, a task of international co-operation.

In connexion with this second objective, a part of the work of the members of the mission, after they had acquired a thorough and practical first-hand knowledge of the problems of Soviet education (see the introduction to 'Observations of the IIEP mission to the USSR'), consisted in exchanging views with the group of Soviet writers, thus providing an opportunity to suggest improvements and additions which could be made to certain points of the original text. In addition, the members of the mission themselves prepared comments on four subjects which seemed to them to be particularly important and on which they felt that an expression of the point of view of outside observers would be interesting. Raymond Poignant has done the final editing of this work.

It would be illogical and unrealistic to hold every member of the mission personally responsible for all shades of opinion expressed in the final wording of this synthesis. The International Institute for Educational Planning has endeavoured to reflect as faithfully as possible the opinion of the mission as a whole in this final text, and we believe we have succeeded in doing so. We have been helped in this effort by individual comments from the various members. However, it is of the essence of a work of this kind that the editor of the final text and the Institute itself must, in the final analysis, take the responsibility for the published text in its form and content.

The Institute expresses its thanks to the Soviet authorities for having so kindly authorized and facilitated the execution of this study. It expresses special appreciation to the Honourable Chairman of the State Committee for Cultural Relations, of the USSR Council of Ministers, and of the National

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1. In order to avoid frequent repetition of the long title, 'State Planning Committee of the Council of Ministers of the USSR', we will refer to it by its Russian abbreviated title, 'Gosplan'.
2. In the Soviet Union, students of universities or institutes of equivalent level who successfully complete their studies and prepare a 'diploma work' (final thesis) or 'graduation project' receive the title of engineer, agronomist, economist, medical physician, teacher, etc. These titles are not, properly speaking, academic degrees in science. The academic degrees in scientific fields are 'kandidat' (in economics, philosophy, mathematics, physics, etc.) and 'doktor' (in the same fields). The degree of 'kandidat' (postgraduate or special research student) is awarded after completing the 'aspirantura', passing the examinations and submitting an accepted thesis. The degree of 'doktor' is awarded after acceptance and defence of a doctoral dissertation. The titles of 'dotsent' (senior lecturer) and 'professor' are given to those who teach in institutions of university level.
3. The composition of the mission is shown in annex I following the observations of the mission.

Commission of the USSR for Unesco, and his associates, to the authorities of the Ministry of Higher and Secondary Specialized Education of the Ministry of Education of the USSR, to the State Committee for Vocational and Technical Training, the Gosplan of the USSR, the ministries and committees of RSFSR of Russia and Azerbaijan, the Academy of Pedagogical Sciences of the USSR, and others who very kindly welcomed the members of the mission and provided them with information and reference data. Our thanks are also extended to all directors of schools, professors and teachers and local educational administrators, who gave freely of their time to the members of our mission.

We are specially grateful to the four Soviet writers, and particularly to the co-ordinator of the work, Mr. Nozhko, for the heavy task which they so willingly undertook at the request of our Institute and which they carried out so well.

We are grateful, last but not least, to the members of the international mission for the efforts which they put forth in the performance of the difficult task which had been entrusted to them.

We are happy today to submit the result of all that work to the attention of those who, throughout the world, are actively concerned with the vast new problems which arise in planning the development of educational systems.

Philip H. Coombs
Director, IIEP

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Educational system in the USSR: organization and planning

by K. Nozhko
E. Monoszon
V. Zhamin
V. Severtsev

Translated from the Russian
by IIEP

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General introduction

The level of the educational and cultural development of a society is determined by a country's material production, its economic development; for education to develop, the necessary social and political conditions must first exist. Educational development, however, does not automatically follow from increased material production. The process depends on the efforts society devotes to the task, and on the material resources which society can allocate to developing the material basis for institutions of public education.

Economic progress on the other hand is indissolubly linked with, and depends on, the educational level of the population, as well as growing productivity of labour, and the full and rational use of a country's labour resources. High rates of national economic development cannot be achieved without educated people, qualified workers and specialists in different branches of knowledge. This means that there must be a broad and well-organized system of public education. However, it is impossible to achieve a high level of education for the broad masses of workers unless a country's economy is developed, since it is only when the level of labour output in branches of material production is high that it is possible to achieve a wide expansion of public education.

From the very beginning of the Soviet régime first priority was given to pressing economic problems, to ways of organizing the national economy, of registering and controlling production management. It was particularly necessary to solve these problems in an historically short space of time, since pre-revolutionary Russia was an economically backward country with a very low level of public education.

V.I. Lenin, founder of the Soviet State, in his article entitled, 'The immediate tasks of the Soviet régime', observed: 'The task of state administration which has now become the first priority of the Soviet régime has this further special feature that - possibly for the first time in the modern history of civilized peoples - we have to tackle the problem of setting up a form of government where preference in order of importance will be given not to politics but to economics.'

Guided by Lenin's plan for constructing socialism, our country has adhered to the general policy of the Communist Party of the Soviet Union (CPSU) for industrializing the country, collectivizing agriculture and achieving a cultural revolution. The problems of economic development were tackled on the basis of the national economy's technical requirements and of a wide expansion of public education.

It is common knowledge that in pre-revolutionary Russia three-quarters of the population of the age of 9 and above were illiterate; and in many areas of Central Asia and other border regions of tsarist Russia almost the entire population was illiterate.

With the establishment of the Soviet régime in the USSR, the political as well as economic prerequisites were created for carrying out a cultural revolution. In the early years of the régime an immense amount of work was done to abolish illiteracy. A uniform system of schools for working-class children was instituted, which opened up wide possibilities for these children to obtain education, including advanced studies. The elimination of illiteracy and semi-literacy and the wide expansion of schools created the necessary prerequisites for developing higher and secondary specialized education in the country. As Lenin wrote, 'Without the guidance of specialists in the various branches of knowledge, technology and experience, the transition to socialism is impossible, since socialism calls for a deliberate and mass movement forward towards higher labour productivity compared with capitalism, utilizing capitalist achievements.'[1]

The Russian people during the years of Soviet power have carried out important economic and cultural reforms in their country. The economic reforms were successfully achieved, however, only as the result of a steady rise in the educational and cultural level of the Soviet people.

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[1] V.I. Lenin, Works, vol. 27, p. 219, of Russian text.

This progress followed what was considered to be an objective natural law of a socialist society. Lenin pointed out that socialism implies the systematic organization of a socially productive process 'for ensuring full prosperity and free, all-round development of all members of society'.[1] The principal aim of socialist production is to ensure fuller satisfaction of the ever-increasing material and cultural requirements of the workers.

The extent and scope of the cultural revolution carried out in the USSR during the Soviet régime are revealed in the following figures. In tsarist Russia the number of persons who went beyond primary education was 1.4 million, whereas in the USSR, according to the 1959 population census, they numbered 71.2 million. Illiteracy has virtually ceased to exist in the USSR.

In tsarist Russia in 1913 the number of people with higher, incomplete higher and secondary specialized education was only about 290,000, including those who did not use their training; whereas at the beginning of 1965 the number of people with graduate or post-graduate higher education and secondary specialized training[2] (including those engaged in domestic occupations, the armed services and pensioners) amounted to 18.6 million.

During the years of Soviet government, educational institutions in the USSR produced 6.1 million specialists with higher education and 9.7 million with secondary qualifications. In comparison with pre-revolutionary times this meant a steep rise in the extent to which the national economy was equipped with specialists. All branches of the national economy and culture now have highly qualified personnel. As of 15 November 1964, Soviet enterprises employed 11.2 million specialists, not counting members of the armed services, of whom 4.5 million had higher education and 6.7 million secondary specialized education. By contrast, only about 200,000 specialists with higher and secondary education were employed in 1913 in pre-revolutionary Russia.

It should be noted that, at present, among the specialists with higher and secondary education, there are 6.6 million women or 58 per cent of the total number of specialists. This is conclusive proof that in the Soviet State, women have achieved freedom and equality.

From 1940 to 1964, schools and colleges providing vocational-technical education trained 15 million skilled workers.

In the 1964/65 educational year, the number of pupils taught in the USSR (in all types of institutions) amounted to 68.9 million, of whom 55.2 million were being taught in schools of general education, vocational-technical schools and colleges, schools for factory and plant workers, and higher and secondary specialized educational institutions. This was 5.5 times more than in tsarist Russia, as shown in table 1.

The figures shown in table 1 testify to the Soviet Union's progress in developing secondary general, vocational-technical, secondary specialized and higher education and in training skilled workers and specialists. These results were achieved in a planned economy, and because of the constant concern the Communist Party and the Soviet government showed for the development of education in our country.

In the first year of the Soviet régime, a decree of the Council of People's Commissars, dated 2 August 1918 and drawn up and signed by Lenin, proclaimed the reorganization of schooling on new principles. The doors of educational institutions were thrown wide open to the workers; instruction in all teaching establishments, including universities, became free of charge and students were offered material assistance by the State.

The USSR constitution formally confirms the right of all citizens to education. It is a right made tangible by universal compulsory, eight-year courses of education, by a wide development of secondary general, polytechnical, vocational-technical, secondary specialized and higher education, by the broadest possible expansion of evening and correspondence courses, by the fact that all forms of education are free, by a system of state scholarships, etc. Most students in universities and in secondary specialized educational institutions receive state scholarships and live in inexpensive hostels. All students are exempt from payment for books, textbooks, school requisites, and medical attention. They are also granted specially reduced rates in sanatoria, rest homes, etc. Students of higher and secondary specialized educational institutions who take evening or correspondence courses while working are given supplementary leave allowances at their place of employment extending up to forty days a year. This gives them time to carry out laboratory experiments and to take examinations. In the case of a senior study course, a four-month leave of absence is given to university students, and a two-month leave to pupils of secondary specialized educational institutions - this in order to prepare and defend a graduate thesis.

The education of the people is the most important social task in developing a Soviet society. Education in a Soviet school forms the basis of the vocational, general cultural and political growth

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[1] V.I. Lenin, Works, vol.6, p.37, of Russian text.

[2] The educational terms used in the present English text of the study conform, as much as possible, with those used in the different volumes of World Survey of Education, published by Unesco.

Table 1. Rate of enrolment in the various institutions of learning from 1914/15 to 1964/65

	Number of pupils (in thousand)			Propor-tion(a)	Number of pupils per 10 000 of population		
	1914/15	1940/41	1964/65		1914/15	1940/41	1964/65
General education schools of all types	9 656	35 552	46 664	4.8	607	1 864	2 036
Vocational-technical schools; factory schools	106	717	1 607	15.0	7	38	70
Secondary specialized educational establishments	54	975	3 326	61.0	3	51	145
Higher educational institutions	127	812	3 608	28.0	8	42	157
Total	9 943	38 056	55 205	5.5	625	1 995	2 408

a. Increase in number of pupils in 1964/65 over 1914/15

of a human being and of the formation of a well-rounded personality. Through education, people acquire a mastery of scientific methods and are given the opportunity to take part in the development of science and to enrich the cultural heritage of their country. An increase in people's educational qualifications arises from the need for scientific and technical progress and for the expansion of productive and social relationships. The possession of scientific knowledge enhances the role of the working classes as a productive force. To an ever-increasing extent science becomes a direct force in production when educated people develop scientific learning and apply its achievements. The growth of present-day society is inseparably bound up with science; the latter, in turn, is closely connected with education, which furnishes its disciples with a foundation for their future scientific social and professional activities.

In this way, education in the USSR ensures the production of well-informed, integrally developed and educated citizens capable of doing both physical and intellectual work and of taking an active part in the various spheres of the social, governmental and cultural life of the country. Similarly, the education imparted by higher and secondary educational institutions exerts an active influence on the growth of peoples' cultural and technical attainments, as well as on the degree of development of their individual abilities. Through the latter, it effectively influences the technique of production and the rate of its development, promotes the growth of culture, science and art, the emergence of new social relationships, and the all-round expansion and perfection of democracy. The level of general education attained determines also the level of the individual's spiritual development as regards principles, morals and taste. All of this is of major social significance, both theoretically and practically, in so far as the amelioration or enhancement of the educational level does have, in certain special ways, an influence in changing the social image of society, eliminating serious social inequalities which arise between the intellectual and labour sectors.

As the Soviet people, led by the Communist Party, have embarked on the task of building a communist society, the problems of developing public education have acquired today even more significance than in the past.

The new programme adopted at the twenty-second session of the Communist Party proposes to bring into effect, as one of the basic objectives in the sphere of education and training, a universal compulsory system of complete secondary education. It was pointed out, first, that as scientific and technical development advances, higher and secondary specialized education will need to be further expanded; second, that reduced working hours and the considerable rise in the standard of living of the entire population will produce conditions enabling everyone who so wishes to receive higher or secondary specialized education. The CPSU programme proposes a considerable annual increase in the numbers of pupils attending higher and secondary specialized educational establishments with a view to ensuring that tens of millions of people can be given specialized education.

The need for considerable expansion of public education in the USSR in the years immediately ahead stems from the fact that economic and technical progress increases the demands for better production methods and for the specialized and general training of all workers. The planned socialist system of economy automatically links an acceleration of technological progress with the full employment of the entire able-bodied population and with the most complete possible satisfaction of the individual's material and spiritual needs.

S.C.E.R.T., West Bengal
Date 15.3.69
Acc. No. 2034

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Part One

Educational system and the administration of educational institutions in the USSR

Introduction

In the Soviet Union, a uniform system of education has been set up which includes: (a) schools of general education (with a whole range of different types of educational institutions, including general primary schools, eight-year schools, complete secondary schools, incomplete secondary schools, boarding-schools, secondary schools for children with physiological defects, language schools, schools with a bias toward mathematics, biology, chemistry, etc.); (b) schools and colleges for the vocational-technical education of workers and collective farmers, secondary specialized educational establishments (technicums); (c) higher educational establishments (universities, institutes, academies, special higher schools).

The Soviet system of education is designed to link education and training of the rising generation with life, and, for adults, to combine regular work with continued instruction and education adapted to their personal vocation and the needs of society. Our society calls for education to be flexible enough to take into account the genuine demands of the national economy and culture, and also the diverse interests and working and living conditions, as well as the tastes and abilities, of the younger generation.

The educational system in the Soviet Union has been based from the outset on the continuity, uniformity and inter-relation of all grades of education and types of schools (general educational and vocational, secondary and higher). It is designed to provide access to education for the working masses, a dream which had long been cherished by the leading intellects of mankind. Marx and Lenin provided scientific arguments in support not only of the practicability of such a system but also of its need in the context of the new social structure. By creating - during a profound cultural revolution that constituted one of the important aspects of Lenin's plan for building socialism in the USSR - its own system of education, the Soviet government is giving practical effect to this great task on a state-wide scale, for the first time in history.

Chapter 1 Primary and secondary general education

Section I ELIMINATION OF ILLITERACY

A. ELIMINATION OF ILLITERACY - AN IMPORTANT LINK IN THE CULTURAL REVOLUTION

The October Socialist Revolution was the starting-point for a profound cultural transformation of Russia. The twin labours of constructing a new society and reconstructing the country economically called for raising the educational and cultural level of the masses who, under tsarism, had been condemned to illiteracy and ignorance. According to 1897 census figures, literacy in Russia was only 24 per cent (of all persons above 9 years of age); i.e., 35.8 per cent of the male population and 12.4 of the female population. In the rural population literacy was lower still while peoples of non-Russian nationality were disadvantaged by the colonialist policy of tsarism. Thus, according to the same census figures, literacy among the Tadzhiks amounted to 3.9 per cent, Kasakhs 2.1, Uzbeks 1.6, Turkmen and Yakuts 0.7, and Kirghiz 0.6. Two decades later, in 1917, the educational level of tsarist Russia was still one of the lowest in the world. 'In no country of Europe except savage Russia', Lenin wrote, 'were the masses of the people so despoiled in the matter of education, enlightenment and learning.'[1]

In Lenin's view, the beginning of the struggle for cultural transformation entailed the enlightenment and spiritual emancipation of millions. Amplifying this view, he said in a speech to the second all-Russian congress of Soviets on the second day of the socialist revolution, 26 October (8 November) 1917: 'In our opinion, the strength of a State lies in the awareness of the masses; a State is strong only when the masses are well informed, can pass judgement on any issue, and make their own decision.'[2]

After the victory of the workers and peasants in the October Revolution, it became vital for the working masses to gain a mastery of culture and knowledge. Thus the Communist Party and the Soviet government soon set about implementing plans for a cultural revolution. In the Address to the citizens of Russia, delivered on 29 October (11 November), A.V. Lunacharsky, People's Commissar for Education, wrote: 'Any truly democratic authority in the educational sphere of a country where illiteracy and ignorance are rife must make its first task that of combatting this atmosphere of gloom. It must, in the shortest period of time, try to achieve universal literacy by organizing a network of schools that satisfy the requirements of contemporary education and by introducing universal, compulsory, free education. The fight against illiteracy and ignorance cannot be confined merely to organizing properly school teaching for children, adolescents and young persons. Adults too will want to be rescued from the humiliation of being unable to read or write. Schools for adults must occupy a prominent place in the general plan of education.'

Subsequently, the programme of the Communist Party at its eighth congress (March 1919) defined the means for raising the cultural level of the masses. The programme called for the introduction of free, compulsory general and technical education for children of both sexes up to 17 years of age as well as sufficient government help for the self-education and self-development of workers and peasants through the creation of a network of extra-scholastic educational institutions, such as libraries, schools for adults, peoples' institutes and universities, courses, lectures, cinemas, studios, etc.

The department for extra-scholastic education of the People's Commissariat for Education, headed by N.K. Krupskaya, a prominent Communist Party worker and distinguished Soviet pedagogue of the Marxist school, carried out a great deal of work in bringing education and enlightenment to adult workers.

The first all-Russian congress on extra-scholastic education was held in May 1919. Lenin appealed to its members to combat the cultural backwardness of the workers and emphasized the special need for eliminating illiteracy. The congress outlined a plan for universal education in the republic and requested the Soviet government to help promote the important cause of universal literacy by enacting a special decree addressed to that subject. The request was granted.

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[1] V.I. Lenin, Works, 3rd edition, vol.16, p.140.

[2] V.I. Lenin, Works, vol.26, p.224.

B. MILESTONES OF LITERACY WORK

On 26 December 1919, Lenin, as President of the Council of People's Commissars, signed the historic decree 'on the elimination of illiteracy among the population of the RSFSR.' The decree compelled the entire population of the republic between the ages of 8 and 50 years to learn to read and write in a native language or in Russian, as they preferred. The decree created the conditions prerequisite for achieving universal literacy. It provided a two-hour reduction in the working day without loss of wages for pupils attending schools for reading and writing. Furthermore, permission was granted to make use of peoples' institutes, churches, clubs, private houses, or suitable premises in factories, Soviet institutions, etc., as places to teach illiterate persons.

The closest co-operation was enlisted from workers' organizations - trade unions, local cells (embryo organizations) of the Communist Party, the Young Communist League ('Komsomol'), committees working among women, and other private organizations. Given the exceptional national importance of eliminating illiteracy and the shortage of teachers, the entire literate population of the country not in military service was mobilized as a form of labour service to instruct millions of illiterate and semi-literate persons. Payment to these temporary teachers was made at the standard rates for educational workers.

Wide-scale publicity was given to the decree. An active part was taken by Party, trade union and 'komsomol' workers, teachers, writers and artists. Slogans, posters and slides were exhibited everywhere proclaiming: 'Down with illiteracy', 'Illiteracy is the blood-sister of destruction', 'Literacy is the way to communism', 'Literate people - teach the illiterate', etc. These appeals were even inscribed on the walls of buildings and on street pavements.

After the decree was promulgated, the Council of People's Commissars of the RSFSR organized an all-Russian extraordinary commission for the elimination of illiteracy which, over the years, coordinated the activity of various bodies in teaching illiterates.

A widespread non-governmental movement ('likbez'), headed by Party organizations in the towns and countryside, developed throughout the USSR. The campaign for literacy was headed by communists and Party organizations in towns and country. Statistics are incomplete, but in 1920, despite civil war, foreign intervention and economic disruption, more than 12,000 literacy centres ('likpunkty') were operating in forty-one European provinces ('guberniye') of the RSFSR and in the autonomous territories (Tchuvashskaya, Marii-skaya, Komi, etc.).

Teaching went on everywhere, even in the open air. Teachers used home-made devices, posters, newspapers and pamphlets. Special ABC books were compiled for adults. Many local intellectuals and prominent workers in young socialist cultural groups joined in the campaign. Maxim Gorki, the writer, was a member of the 'likbez' extraordinary commission, and under his sponsorship a special series of books for semi-literates was published. Vladimir Mayakovsky, the poet, drew artistic propaganda posters and composed verses dedicated to the literacy campaign (Agitazbuka, etc.). Teachers did an enormous amount of work in eliminating illiteracy. When they were free from school duties they personally gave lessons to illiterates, acted as instructors in 'likbez' and directed the work of volunteers. Officials of Soviet departments, students, librarians, superintendents of rural cottage-libraries, agricultural specialists, physicians, pupils of the senior classes of secondary schools and literate workers and peasants all contributed their efforts.

By July 1921 (according to figures of the extraordinary commission), 4.8 million people had already been taught, more than half of them being Red Army soldiers. Nevertheless, neither the Communist Party nor the Soviet government considered these accomplishments as sufficient. The work of eliminating illiteracy was hindered by the campaign against the cultural revolution being waged by enemies of the social structure - the bourgeoisie and the Kulaks. In the non-Russian republics bourgeois nationalists were stubbornly opposed to the elimination of illiteracy.

Other problems arose, including those of an economic and psychological nature. Many elderly people refused to learn to read and write because of their age or the fact that their parents and grandparents had been illiterate and had managed without book-knowledge. Many people stopped attending literacy school as soon as they confronted the first difficulties. Educational organs and social organizations undertook to explain the need to master reading and writing, and the personal and social meaning of education. Uncertain economic conditions for the working masses in the first years of the Soviet State also rendered complete elimination of illiteracy and semi-literacy more difficult. A large public campaign was organized to give material help to needy families whose breadwinners died as a result of the civil war. Illiterates and semi-literates were provided with textbooks and writing materials at government and community expense.

The Party's Central Committee and the Soviet government took steps to overcome the difficulties and to solve the problem of raising the cultural level of the people. In 1922-23 all-Russian and local congresses were held at which the practical problems connected with implementing the Lenin decree against illiteracy were discussed. Steps were taken to see that reading and writing schools were supplied with textbooks, copybooks and pencils. In 1923 a voluntary society, 'Doloï megramotnost' - ODN (Down with illiteracy) was formed to assist 'likbez', with M.I. Kalinin, chairman of the Central Executive Committee of the USSR, as its head. As stated in the statutes of ODN, the principal aim of the society was 'to campaign for the mass literacy of all the peoples of the RSFSR.' To this end, 'the society from its own resources and with support from private individuals will: (a) eliminate illiteracy and semi-literacy among adults and backward or retarded persons; (b) carry out mass political educational work both among its own members and among students and social teachers, and induce them to take a practical part in the economic and political life of the country'.

With the help of many activists, such as the 'komsomols', the 'Down with illiteracy' society greatly advanced the work of eliminating illiteracy and semi-literacy in the country. The 'Pioneers, friends of ODN', whose members taught illiterate adults, delivered library books, organized amateur theatre groups and concerts at 'likbez' centres, etc.

In carrying out the resolutions adopted at the second all-Russian congress for the elimination of illiteracy, a plan was devised to eliminate illiteracy among the USSR population between the ages of 18 and 35 by the tenth anniversary of the October Revolution. The first of May, 1925, was the date by which illiteracy was to be eliminated among members of the Party and 'komsomols', delegates from women's branches, members of councils of workers' deputies, members of trade unions and among youth undergoing military training. In this way, it was planned to teach 8 million persons to read and write in 1925-26.

Literacy centres were all the more popular with the people because the reading and writing courses were accompanied by courses in political education and by lectures on the fundamentals of socialism. Talks were conducted on current political and economic problems, i.e., the new economic policy, the Soviet land code, co-operation, etc. In many schools and centres in the countryside the pupils were also taught elementary facts about agriculture.

Measures were taken to perfect the organization and methods of training the illiterate. Schools and literacy centres used the phonetic reading method, both analytical and synthetical, of teaching reading and writing in local languages. This method is called 'phonetic' because it is based on the teaching of language sounds and the manner of transcribing these sounds. Knowledge of the peculiarity of different sounds and syllables of the native tongue, the manner of designating these sounds by letters, and the analysis of word structure and the arrangement of syllables in words, helped the students to learn to read comparatively quickly.

In teaching reading and writing, instructors cut out each letter of the Russian alphabet and glued them on cardboard. An assembling board was then used. It was a rectangular board on which were sewn or glued horizontal cardboard strips. The top part could be folded over; the letters of the alphabet were placed behind this folding part to form syllables and words.

Throughout the entire period of instruction, reading and writing were taught simultaneously and the same method was followed for both.

As supplementary devices to help the illiterate, placards were hung in many public places, such as reading rooms, clubs and bazaars, showing the letters of the Russian alphabet. Other methods of visual teaching of reading and writing were used as well.

A great deal of work was done on abolishing illiteracy among people of non-Russian nationality. For instance, early in 1926, 540,900 illiterates were learning to read and write in the Ukrainian SSR, 36,400 in Belorussia, 29,600 in Azerbaijan, 67,600 in Georgia, 18,800 in Armenia, 7,700 in Turkmen, 26,300 in Uzbekistan, 500 in Tadzhikistan, 23,200 in Kazakhistan, and 7,500 in Kirgizia.

In the national republics and regions, the task of eliminating illiteracy was hampered by the fact that many nationalities did not, prior to the October Revolution, have a written language of their own. At the time of the tenth anniversary of the revolution, written languages had been created for sixteen nationalities and five years later the number had reached forty-eight. Reforms of the written languages of many peoples were pursued simultaneously and, in particular, the alphabets of many of the national languages were transposed into Russian letters to help win the fight for universal literacy. Millions of editions of ABC spelling-books and textbooks were published in native and Russian languages for previously backward peoples.

Newspapers and special periodicals were published both centrally and locally for pupils of 'likbez' schools and for semi-literates; they were printed in large type and contained study material. Radio was also used as a medium for teaching. Central and local broadcasting stations made it a practice to organize a series of general educational transmissions, and wide publicity was given by this medium to the progress of adult education and 'likbez' work in general.

Along with literacy schools came massive development of other methods of teaching young persons and adults. There were one-year and two-year general educational courses, courses in political education, advanced courses for adults, workers' faculties ('rabfaky'), Soviet Party schools, and workers' colleges. The 'rabfaky', which sprang up early in 1919, played a special role in training workers for executive positions. They were set up in higher educational establishments to prepare workers and peasants for advanced study.

By the end of 1927, the country's national economy had been largely rebuilt. The objectives of socialist reconstruction made it necessary, however, to intensify the campaign for a further improvement in the cultural level of the working class and peasant labourers. Directives issued by the fifteenth Party congress, which drafted the first five-year plan for national economic development, pointed out:

'In connexion with the objectives of socialist reconstruction, the five-year plan must take into account the need for a definite rise in the cultural level of rural and urban populations, an expansion of the national cultures of the peoples of the USSR, and must link cultural progress with the industrialization of the country, as an inseparable part of the general plan for socialist construction in the USSR.

'The plan for cultural construction must be based on those objectives of popular education which ensure the cultural growth of the broader working masses (universal education, abolition of illiteracy, mass vocational and technical education, etc.) and on the task of training qualified specialists and scientific workers.'

In accordance with the state plan for cultural construction, the 'likbez' schools were to complete the transition to literacy of more than 18 million people in the five-year period.

The movement to eliminate illiteracy in Russia developed fresh momentum. Basically, it took the form of a culture campaign ('kutpokhod'), organized on the initiative of the 'Komsomol', which continued over several years. The league enlisted the services of the younger generation for the 'likbez' movement. The Central Committee of the all-Russian Young Communists urged 'komsomol' organizations to arrange to have a loose leaf inserted in the 'komsomol' membership card or book to certify that the member had actually taught an illiterate pupil. Thousands of these members taught three, five or ten illiterates each.

Local Soviet organs, departments of public education, the 'komsomol' movement, the 'Down with illiteracy' society, the co-operative movement and various private organizations under the leadership of Party organs formed a single 'cultural campaign' front. Cultural campaign offices sprang up everywhere and the campaign's tasks became gradually more extensive. Militants made a point of seeing that all children attended school, campaigned for cleanliness and hygiene in factories and in the everyday environment. 'Kultpokhod' methods were used to teach agricultural techniques and to increase the number of pre-school institutions and libraries. Socialist emulation in 'likbez' work became widespread in workshops and factories, towns, regions and republics; it took on various forms and used various methods ('likbez' spartakiad sports competitions, cultural campaigns, 'counter-culture' plans, reciprocal checking of commitments, organization of help for backward pupils - the so-called 'social towing', etc.).

Besides teaching illiterates, more intensive efforts were devoted to the mass education of semi-literates; this was of great importance as it prevented relapses into illiteracy and helped to raise the cultural level of the people.

But the culture campaign, as a mass movement to promote culture, also had a number of defects. There was a certain hastiness in the teaching of illiterates and an insufficient allowance for their vocational interests. The massive movement was not always fully planned and organized.

In May 1929, the Party's Central Committee adopted a resolution on 'work on the elimination of illiteracy'. It drew attention to the need for a radical reorganization in the light of accumulated experience. There was to be a systematic organization of the task of eliminating illiteracy on the basis of a single plan. It called for a union of forces and resources, along with a wide measure of autonomy to all organizations participating in the elimination of illiteracy.

The sixteenth congress of the Communist Party (June-July 1930) made the introduction of universal compulsory primary teaching and the elimination of illiteracy priority tasks. Special local committees (territorial, provincial, regional, urban) were formed which were to conduct operational work and direct the activities of all departments and organizations engaged in eliminating illiteracy. In order to standardize the financing of this work, a single 'likbez' fund was set up, financed by grants from local soviets, trade unions, co-operatives and other organizations.

In early 1934, as a result of the creation of the fund for 'likbez' work, more than nine-tenths of the population were able to read and write in their native tongue. The target for the teaching of illiterates and semi-literates, as laid down in the first five-year plan, had been more than fulfilled. In subsequent years the work on eliminating illiteracy and semi-literacy was continued. During the years 1933-37, 21 million illiterate adults and about 20 million semi-literate adults were given instruction. The results of the work done in the USSR to eliminate illiteracy are illustrated by the 1939 population census figures in.table 2.

Table 2. Literacy of the USSR population between the ages of 9 and 50 (in percentage)

	Males	Females	Total
Total population			
9 February 1897	39.1	13.7	26.3
17 December 1926	71.5	42.7	56.6
17 January 1939	95.1	83.4	89.1
Urban population			
9 February 1897	65.5	43.1	55.6
17 December 1926	88.0	73.9	80.9
17 January 1939	97.6	91.0	94.2
Rural population			
8 February 1897	34.3	9.6	21.7
17 December 1926	67.2	35.9	50.6
17 January 1939	93.8	79.2	86.3

Particularly striking progress in eliminating illiteracy was made in the Union republics. In 1939, the literacy level among women in the previously most backward republics (Tadzhikistan, Uzbekistan, Turkmenistan, Kirgizia and others) closely approached that of men. In solving the problem of eliminating illiteracy Lenin's nationality policy played an enormous part, as it gave all citizens of the USSR the right and the opportunity of being taught in their native tongue.

Before the Second World War began, Russia had practically reached the point of complete literacy.

The Communist Party regarded the campaign for literacy as an essential first step to increase the general educational level of the workers. This was precisely why a network of general educational schools for adults was widely expanded, parallel to the rapid increase in similar schools for children. In the 1930s, the emphasis of the 'likbez' system shifted to work with semi-literates to provide education in basic subjects during four years of primary education. After finishing these schools, pupils entered more advanced adult schools and then went on to prepare for universities and workers' colleges. A network of secondary education courses by correspondence was also developed. Already in 1937, there were 7,187 secondary evening schools (complete and incomplete) giving tuition to more than 500,000 persons, while in 1939 there were more than 750,000 persons studying in these schools.

Thus, during the years of Soviet rule tens of millions of adults had become literate, had overcome their cultural backwardness and became active fighters for building socialism.

C. GUIDE-LINES IN THE WORK OF ELIMINATING ILLITERACY

To conclude, here are the basic principles on which work for the elimination of illiteracy was organized.

The Soviet socialist State, from the first days of its existence, decided that one of its most important functions was cultural and educational development. To that end, it set itself the task of making all workers literate and creating conditions for constant improvement in the level of their education and culture. It extended every assistance for workers and peasants, including cultural and educational institutions, such as libraries, centres and universities, village reading rooms, cinemas, etc.

The transformation of the USSR within two decades into a country where literacy was universal was the result of united action between governmental and non-governmental organizations, which, under the leadership of the Communist Party, carried out an immense programme of cultural improvement for the workers. The elimination of illiteracy and semi-literacy became a national endeavour.

The success of the 'likbez' plan was due in large measure to trade unions, 'komsomols', and the mass-supported voluntary society, 'Down with illiteracy', which mobilized within its ranks some 5 million 'culture soldiers'.

Teaching adults to read and write was closely linked with the political education of the workers and with imparting a minimum of technical and agricultural knowledge, indispensable for raising the labour productivity. In this way, the pupils gained a genuine conception of how literacy could better their living conditions and raise the country's economic level.

The relative speed with which illiteracy and semi-literacy were overcome in such a formerly backward country as Russia, especially in border areas, could not be achieved without extensive planning. Target figures for eliminating illiteracy were inserted in the annual and five-year plans for development. Accurate statistics of illiterate and semi-literate persons, the formation of uniform 'likbez' plans in every enterprise and every populated centre, as well as strict responsibility for their execution, were important elements in the success that was achieved.

In a huge country, the varied living conditions of illiterates evoked widely different forms and methods of teaching, such as individual and group lessons, school and home tuition, after-work teaching in factories, lessons given to illiterates in field camps, in the tents of nomadic herdsmen, on board ships, and so on.

The peoples of the multi-racial Soviet Union were given the possibility and material conditions for literacy through national language school books and teaching manuals, and national teaching staffs.

The establishment of a genuinely democratic uniform system of adult education - from the 'three Rs' school to the university - and the prospect of obtaining a complete course of education without leaving the production bench proved to be valuable incentives.

Experience gained in abolishing illiteracy in the USSR can be successfully utilized in other countries, making allowance for the special social and national features of their development.

Section II IMPLEMENTATION OF UNIVERSAL COMPULSORY EDUCATION

A. BASIC STEPS IN IMPLEMENTING UNIVERSAL EDUCATION

The campaign to raise the cultural level of the masses of the people called for a radical reconstruction of the school - the most important link in the educational system.

Tsarist Russia occupied one of the lowest places in Europe in the development of public education. In 1911, Russia had thirty-eight pupils per thousand inhabitants. Class distinction was rife. The children of the nobility had privileged educational establishments, such as 'lycées', cadet schools, and institutes for girls; the children of the clergy as a rule were educated in religious schools or in seminaries. The education of the children of the working-class population was confined to elementary schools and craft or trade schools.

When the revolution destroyed the old class system of education, it also cleared the ground for building a new working-class socialist school. In December 1917 the Council of People's Commissars promulgated a decree which transferred the primary, secondary and higher schools of the church to the People's Commissariat of Education. The following month saw the separation of the church from the State and the school from the church, thus abrogating all privileges based on religious affiliation. The school became a secular institution, free from the influence of religion. The peoples of the USSR obtained the right to schools and other educational establishments teaching in their native language, to publish national language school books and train their own teaching staff.

The young Soviet Republic ventured to eliminate the remnants of bourgeois feudalism by proclaiming equal rights for women, including equal rights to education at every level.

The decree of the all-Russian central executive committee of the Councils of Deputies, dated 16 October 1918, defined the basic principles 'for uniform workers' schooling'. Simultaneously, the People's Commissariat of Education published a declaration of basic principles on the same matter. In these documents, the foremost task was the complete democratization of the school system. Schools were declared to be the property of the population as a whole. They were to be fully accessible to all children of both sexes and instruction was to be free. The concept of universal and compulsory instruction was looked upon as a task to be accomplished at the earliest possible moment. The uniform workers' school at first and second levels, with a general nine-year course of instruction, was declared by law to be the basic link in the educational system. From the standpoint of organization and systematic programming, the two levels of schooling were fully and organically linked with one another, thus ensuring the unimpeded transfer of pupils completing a first-level school into a second-level one. The principle of uniformity and unhindered promotion became the guiding principle for the whole system of public education. As stated in 'Basic principles of uniform schooling for workers', 'The whole system of ordinary schools from kindergarten to university represents one school, one unbroken ladder.'

The Regulations and the Declaration set forth the link between school and life, between education and labour. The school was entrusted with the task of developing pupils intellectually, physically, morally and aesthetically, of inculcating the rising generations with the spirit of collectivism and internationalism. It was to encourage the development of creative activity and initiative. Stress was laid on the importance of pupils' organizations and of various clubs with educational and instructional aims. Dogmatic methods of instruction were to be dropped in favour of methods that would stimulate a desire for knowledge and active effort among pupils.

The Declaration was not without faults. For instance, it underestimated specialized teaching in the different disciplines and insisted more on educational work being based on productive labour. None the less, the Regulations and the Declaration helped set the stage for building a Soviet school suited to the new social relationships in the country.

School education continued to develop along the lines of the Communist Party programme which was adopted at its eighth congress in March 1919. The Party programme called for the introduction of universal and compulsory education, both general and technical, for children of both sexes up to 17 years of age. They were to be acquainted with the theory and practice of the principal branches of production. The principle of uniform schooling for workers was to be fully implemented with instructions given in the native language. Schools were to be absolutely secular and to maintain a close connexion between teaching and socially productive labour and to prepare for the all-round development of members of a communist society.

One of the most important tasks proposed by the programme was the development of a new teaching body imbued with communist ideas.

In the early years of the Soviet régime, considerable work was done in developing a network of schools and bringing young persons of both sexes and of varying age-groups into the educational system.

Even at that time, the Communist Party and the Soviet government consistently and persistently strove to achieve universal education. But military intervention and the civil war, added to the damage done to the country by the war of 1914-18, prevented its realization. Yet, despite the particularly difficult circumstances resulting from the civil war and economic devastation, the network of primary and secondary schools was considerably expanded: 118,180 in 1920/21 as against 105,500 in 1914/15.

As the network of schools expanded, conditions were created for a subsequent transition to universal compulsory primary education and to full access to secondary education.

In August 1923 the Council of People's Commissars of the RSFSR decided on a plan for introducing universal compulsory primary education to be completed by the 1933/34 school year.

The fourteenth all-Russian congress of Soviets, held in 1929, agreed on the possibility of accelerating the rate at which primary education could be brought into effect.

At the sixteenth congress of the all-Union Communist Party in 1930 a decision was taken to introduce universal compulsory primary education in the USSR. The realization of universal education, as a highly important link in the cultural revolution, had become particularly essential and, at the same time, feasible in view of specific socio-economic and political factors. By the beginning of the 1930s the USSR had made marked progress in socialist industrialization. Socialist reconstruction of agriculture had been achieved in the form of the complete collectivization of the rural economy. The implementation of the five-year national economic plans had transformed the face of the country. The problem of producing skilled workers, versed in new techniques, for industry and agriculture had become one of immediate importance. The introduction of universal primary instruction and then the transition to seven-year education now became possible because the essential material basis had been created, i.e., heavy industry had been established and the level of the people's material prosperity raised.

By a decision of the Central Executive Committee and of the USSR Council of Ministers (August 1930), universal compulsory education was introduced throughout the country for boys and girls from the age of 8 years for at least a four-year course of primary schooling, and also for retarded children from 11 to 15 years of age who had not, for whatever reason, received primary education. This decision also introduced universal compulsory education of boys and girls in seven-year schools as from the 1930/31 school year in industrial sections and workers' districts.

In order to carry out this task in each Union republic, committees for the introduction of universal education were set up in each republic. Similar committees were established in all local councils (soviets), from regional to village levels. A powerful movement developed throughout the country in favour of universal education in which, apart from education bodies and local councils, an active part was played by the 'komsomols', trade unions, co-operative societies, enterprises and collective farms. There was extensive development of boarding-schools (hostels) to accommodate pupils living a great distance from school. In order to extend material help to needy children in the form of clothing, shoes and food, special 'universal education' funds (republican, territorial, provincial, urban, regional, village, rural and school) were established. Supplementing official appropriations, business and private organizations contributed to such funds.

The rate at which universal education was achieved in the USSR outstripped the experience of all other countries in the world. By 1932, almost all children between 8 and 11 years of age were in school and from then on the increase in the number of pupils was chiefly in grades 5 to 10 in secondary schools. Between the school years 1928/29 and 1938/39, the number of pupils in schools of general education in the USSR rose from 12.1 to 31.5 million, or 2.6 times.

As the network of schools increased, and universal compulsory general education came into effect, the need for teaching staff grew incessantly. A great number of persons necessarily had to be trained to teach in primary schools. Accordingly, in addition to increasing pedagogical technikums it was necessary to organize one- or two-year teacher-training courses.

In certain areas, particularly autonomous regions, four- to six-month courses were even set up. General secondary schools with a pedagogical orientation provided a great number of teachers for primary grades. Evening and correspondence departments were opened in teacher-training institutes and technikums. Thus, the network of primary, day and evening teacher-training institutes was extended.

At the beginning of 1930, in the RSFSR alone there were ten teacher-training faculties in universities, twelve teacher-training institutes, 211 pedagogical technikums, and 446 secondary schools with a pedagogical emphasis. A similar expansion of institutions for training teachers for non-Russian schools also occurred. As an incentive for young people to enter institutes for the training of teachers, the scholarship fund was greatly increased, and almost all students benefited from this. In 1930 alone, the Young Communist League appointed 20,000 'komsomols' to work in schools for general education.

The difficulties involved in providing schools with teaching staff were even greater in the republics and autonomous regions. Measures were introduced to encourage the return of all former teachers working in different branches of the national economy. Engineers and technical workers were authorized to hold more than one position so as to start teaching physics, chemistry, biology, mathematics and mechanical drawing. Later, a major effort was made to raise the qualifications of teachers by means of correspondence and refresher courses. Publications dealing with teaching methodology began to appear: *Natural sciences in the work school*, *Physics, chemistry and mathematics in the work school*, *Russian language and literature in the work school*, and others.

One of the serious problems involved in providing universal education was the insufficiency of school buildings. The Soviet government took measures to accelerate school construction and began by providing government buildings and securing the use of large private houses. Quite often houses in the country had to be converted into schools for the teaching of rural children. Thus, the situation was not ideal for teachers and school administrators. In many city schools, instruction took place two and even three times a day for different groups.

The development of the 'kolkhozy' speeded universal education as new kindergartens and school buildings were built from public funds. Difficulties were slowly overcome by the efforts of teachers, education offices, and the Soviet society.

The third five-year plan, adopted at the eighteenth congress of the Party, outlined a gigantic programme of cultural construction. Its aim was universal secondary education in towns and the completion, in villages and in all the national republics, of universal seven-year schooling along with progressive expansion of the system so as to give children ten years of education.

A detailed system was introduced for the registration of children subject to universal education and a strict check was made of their school attendance record.

The attack launched on our homeland on 22 June 1941 interrupted the peaceful constructive activities of the Soviet people. Yet, in spite of the grievous war-time conditions, Soviet schools did not discontinue their work. Official and private bodies continued to wage the campaign for achieving universal education even while children were being evacuated 'en masse' from threatened areas and teachers were being called up for active army service.

The following is taken from a leading article of 24 March 1942 in *Pravda*, the central organ of the Communist Party: 'However preoccupied we may be by the war, concern for our children and for their education is still one of our principal tasks. . . The law on universal education remains unaffected in war-time conditions. We must keep a register of all the children and keep it properly, regardless of war-time complications. No allusions (are allowed) to war-time conditions . . . .' Under difficult circumstances, education bodies, schools and Soviet society waged a tireless battle for universal education under the slogan, 'No child without schooling'.

In the course of the school year checks were frequently made of the number of children living in the immediate area of the school who were liable to attend school. Permission was given for supplementary single-staffed schools (schools in which one teacher works, giving instruction simultaneously in several classes) in populated areas having not less than fifteen children of school age and situated not less than three to four kilometres from the nearest school.

It was extremely difficult to provide universal education near the front and in areas that had been liberated from enemy occupation as tens of thousands of school buildings were destroyed. In the Ukraine alone up to 20,000 school premises were destroyed. With the active working help of the population ruined buildings were reconstructed and new schools built.

A resolution of the Council of People's Commissars of the USSR of 1 December 1943 introduced the education of children starting from 7 years of age and this led to a great increase in the numbers of pupils. In the school year 1944/45 the number of pupils in Soviet schools rose by 2 million.

This measure played a very great part in the teaching and education of children. It did away with the gap between kindergarten and school. Children from 3 to 7 years of age attended kindergarten, while 8-year-olds were admitted to schools. It enabled a 14-year-old at the end of a seven-year course to go on to educational institutions for labour reserves. But the rise in the numbers of pupils resulting from this measure created additional difficulties, such as the need for a larger number of school premises and for more teachers.

For that section of younger people who in the war years had gone into factory and transport work, general educational schools were organized where pupils were given seven-year and secondary education without interruption in their work.

By such means, public education was maintained during the years of the Second World War on a level that ensured that schooling would expand after the country had returned to peaceful life.

In the school year 1945/46, there were 199,300 schools of general education as compared with 198,600 in 1940/41, so that at the end of the war the network of schools of this kind exceeded the pre-war total, although there were 8.7 million fewer pupils. This was a consequence of the great fluctuations in the numbers of children, the difficult material conditions of many families, etc. Furthermore, a considerable proportion of adolescents transferred to the system of labour-reserve educational establishments. Through the medium of the system of individual-team apprenticeship, many had been drafted into productive labour, taking the places of the fathers, older brothers and sisters who had gone to the front.

With the coming of victory, the Soviet nation set about restoring the damage inflicted by the Second World War on its economy and culture. In March 1946, the Supreme Soviet of the USSR passed the law on the five-year plan for reconstructing and developing the national economy for the years 1946-50. This plan proposed to restore and expand the network of primary and secondary schools, to provide universal compulsory education for children from 7 years upward both in towns and villages, and to improve the quality of teaching and education in schools. These targets of the fourth five-year plan were successfully fulfilled. In the school year 1950/51, there were in the USSR more than 200,000 schools of general education with 33.3 million pupils. The number of seven-year schools rose from 45,700 in the school year 1940/41 to 59,600 in the school year 1950/51. New building helped to increase the size of the schools network: in the years from 1946 to 1950, 18,536 schools were built and brought into operation under the official building scheme and on the initiative and at the expense of collective farms.

Party and 'komsomol' organizations, trade unions, and collective farms gave much help to education bodies in the building and equipping of new schools, supplying them with teaching requisites, providing fuel, and organizing children's meals, etc.

In 1949, universal compulsory seven-year education had everywhere become an accomplished fact.

By the end of the fifth five-year plan (1955) universal secondary education had been introduced in the capitals of the republics and the larger towns. The twentieth congress of the Communist Party of the Soviet Union thus decided to move on to universal secondary education in the entire country. The result was a major increase in secondary schools of all types. The Party congress also decided to improve the education of children by creating a new type of educational institution in the 1956/57 school year. This was the boarding school which provided round-the-clock accommodation for children and young persons. Along with this, 'extended day' schools and groups were also established.

In December 1958, the Supreme Soviet of the USSR passed a law 'on strengthening the ties between school and life and the further development of the public education system in the USSR'. It led to the reorganization of seven-year into eight-year schools by the 1962/63 school year. The secondary school network was considerably expanded in consequence.

The number of schools rose to 226,700 against 198,800 in the 1940/41 school year, and the number of their pupils increased from 35.5 million to 42.4 million.

These are the basic stages in the introduction of universal compulsory education in the USSR.

B. ORGANIZATION OF UNIVERSAL EDUCATION

In the USSR universal education is ensured by a web of related means. They include holding parents and schools responsible for seeing that all children of school age are afforded educational opportunities; the rational geographical distribution of schools and school premises; the establishment (where the school is remote from the pupil's place of residence) of boarding-houses (hostels) attached to the schools; providing teachers who are trained to deal with children; enabling children to obtain textbooks, school requisites and materials; extending material assistance to certain needy pupils (free footwear, clothing, hot lunches and meals), and other measures of an organizational-educational character.

The principle of compulsory education rests on a twofold postulate. On the one side, it is the duty of parents, guardians and persons who substitute for them to enrol children who have reached school-age in a school and to see that they attend class throughout the statutory course of tuition. On the other side, it is the duty of the education authorities to provide every child and young person of school age with access to a school place.

The term access, in turn, entails such matters as the teaching language used, the location of the school network and the existence of material conditions for teaching every pupil.

1. Organization of the school network

In places where there is an ethnically mixed population, the school network is organized on the principle of 'parallel districts' - meaning that schools and school districts are determined for each nationality separately. In the USSR, pupils of any given nationality have the opportunity to be taught in their native language. The right to choose the language of instruction is left to the pupil's parents: they can choose their native language, the Russian language or the language of the particular Union republic.

To achieve universal education, the school must be locally accessible, particularly in the case of younger school-age children. This is why in the rural areas of the USSR there is a large number of schools having only one or two teachers for four classes. In thinly populated areas, where the inhabited centres are very small and widely separated, boarding accommodations attached to the schools have been organized. A particularly large number of boarding houses has been set up for eight-year and secondary schools.

The basic method adopted in constructing a school network is to split the territory of the administrative region or town into separate school districts ('micro-districts'), so that specific territories with a given figure of population are served by one school.

If the allocation of schools by districts has been done carefully it should produce a maximum correlation between schools and population, create conditions enabling all children of school age to be covered by schooling, and ensure that teachers can be easily obtained.

The greatest difficulties naturally arise in connexion with school districts in rural areas. Accordingly, education departments devote great attention to local circumstances. In the organizational structure of a school network various factors are taken into account: demographic (size of the population, its composition by nationality and age); territorial (physical profile of the locality, distances, roads); educational-organization (capacity of the school, size of teaching staff, number of classrooms, possibility of single-shift teaching).

In planning the location and staffing of eight-year and secondary schools, there is the problem of how to achieve the most rational interior arrangement of the school so as to ensure proper organization of the teaching staff and work and the fullest use of the classrooms, science laboratories, workshops for production studies, and teaching equipment. In eight-year schools two parallel sets of classrooms are arranged and in secondary schools three or more parallel sets.

In each of the Union republics, depending on local conditions, a specific school radius is established. As laid down by the resolution of the All-Russian Central Executive Committee and the Council of People's Commissars of the RSFSR dated 31 August 1925, the maximum radius of a district served by one primary school is three kilometres. With the introduction of education for children from 7 years upwards permission was given, in the case of populated centres with not less than fifteen children of school age, to open primary schools if the nearest school was more than two kilometres away.

There are no regulations about the radius in the case of districts served by eight-year and secondary schools. In practice, this radius extends to four or five kilometres. At present, owing to the considerable development in Russia of motor-vehicle transport, extensive use is made of the organized transport of children to school, arranged by local soviets, as well as by collective and state farm administrations.

2. Estimating the size of school-age population

The proper organization of methods for estimating the size of the child population is specially important for implementing universal education.

In towns and workers' settlements where the passport system has been introduced, information about children of school age is derived from house registers listing the inhabitants and containing particulars about the children. In some cities, such as Moscow and Leningrad, special books have been introduced to register children of school age. In rural localities, the lists of the population are kept in the village soviet.

The government has laid down the procedure for recording the names of children of school age and keeping a check on how the local soviets and public education bodies implement the universal education law. These operations are carried out on the basis of special instructions approved by the government of the Union republic which define the duties of rural soviets, house administrations and schools in carrying out registration.

Registration is compulsory for children starting from 6 years of age on 1 September of each year - i.e., an age one year younger than the statutory age for admission to grade 1 in schools. By recording the number of 6-year old children it is possible to determine in advance the number of entering pupils for the next school year, and provide a basis for the roll of 7-year old children who must be admitted on 1 September.

In cities or towns, the names of all children of school age between 7 and 15 or 16 years are compiled by the house administrators ('komendants') and by persons empowered by the urban executive committee of councils of workers' deputies to keep a register of such names. The lists are submitted not later than 15 August to the administrative official of the primary school or the head of an eight-year secondary school in whose registration region the particular house administration is included. During the school year, details of changes occurring in the school-age population (arrival or departure of children) are reported to the school not later than three days after each case in the school's micro-district.

Village soviets compile the lists of children with the assistance of the schools concerned by drawing the necessary particulars from farm or homestead registers and population rolls. The rural society notifies the school head of any current changes in the composition of the school-age population.

In school districts with a population composed of a mixture of nationalities and schools with different teaching languages, information about children of different nationalities is assembled on the basis of the single general registration lists of school-age children. Separate lists are also prepared of children who should be admitted to schools for the physically handicapped.

The composite data give a picture regarding universal education in the territory of each school's micro-district, in the territory of the administrative region (or city) and thereafter also, in the territory of the province, region or republic.

These data represent one of the basic conditions essential for planning a school network. Movements of school-age populations and the size of teaching staffs can thus be determined.

3. Infrastructure of education

The material conditions of the work done by schools in providing universal education and ensuring a high level of instruction, such as the erection of school buildings, the equipment of classrooms and laboratories, and the establishment of student workshops and experimental stations, assume great importance in the USSR. Under existing legislation, standard buildings are planned for primary, eight-year and secondary schools, and lists are drawn up of the school equipment each type of school requires.

The extent to which the material substructure for universal education has been provided can be gleaned from a few figures. Between 1918 and 1962 in the USSR more than 250,000 school buildings were erected, more than 150,000 of these since the Second World War. About 96,000 school laboratories were set up. Schools numbering 119,000 have experimental stations.

A great deal of work is done in writing and publishing textbooks and teaching manuals. School books are being published in more than seventy languages of the peoples of the USSR and in editions of millions. Great attention is being paid to installing cinemas in schools, and to using radio, television, teaching machines and other devices in educational work, Libraries are found in all schools. There is an extensive network of municipal, suburban and rural childrens' libraries which encourage extra-curricula reading of books of literature and popular science.

4. Teacher training and upgrading

The most important factor in expanding school education is the production of a sufficient number of highly qualified teachers. At present, 2.3 million teachers are working in schools of general education in the USSR. Teachers of primary classes have been trained in teacher-training schools (three-year courses for graduates of eight-year, and two-year courses for those of secondary schools) and in primary school faculties organized in higher teacher-training institutes. Teachers instructing higher grades (5 to 10) have been trained in teacher-training institutes and universities.

Much work is being done by institutes, schools and universities to provide the teacher with refresher courses, seminars and lectures.

Every five years each teacher should take refresher courses in his own field of teaching. Many books are published on subjects being taught as well as on problems of pedagogy and method systems. Serious attention is paid to standardizing the hours of teaching. At present, the teaching schedule for primary school is fixed at twenty-four hours a week and for teachers of grades 5 to 10, at eighteen hours a week. Where the load is heavier, the teacher is paid a supplementary sum (calculated on the number of lessons actually given). In July 1964, a law of the Supreme Soviet of the USSR increased the salaries of teachers by an average 25 per cent, and a noticeable increase went to teachers in the primary schools and in rural areas. The country teachers have a number of extra privileges such as free living quarters, lighting and heating, and plots of ground for flower and vegetable gardens.

5. Coping with the problems of drop-outs and repeaters

In order to make universal education effective in our country it is essential, on the one hand, to combat the tendency of pupils to drift away from school before finishing their education, and on the other, to improve in every possible way the performance of the pupils and the quality of instruction.

A daily attendance record is kept in every classroom and school and inquiries are made about pupils' absence from lessons. Pupils confined at home by illness are helped in their studies by teachers and senior pupils. Needy pupils are given material assistance from resources of the universal education fund. Occasionally, pupils (especially adolescents) stop going to school because of their poor performance; they are afraid they will be kept back for a second year in the same grade.

Teachers in schools do much work in preventing and overcoming drop-outs and repeating and as a result there has been a systematic decline in the number of students kept back in the same grade for a second year.

In the 1930s, the repetition of the same year in schools was widespread; in departmental and regional schools it amounted to 10 to 12 per cent of the total enrolment. At present, the number of repeaters has decreased sharply and remains at about 3 to 5 per cent. The number of schools and classes without repeaters increases annually. This is due to the improved methods of teaching, the strengthening of the individual approach to students in the teaching process, the recognition of the child's individual work during lessons, and the constant help by teachers to slower pupils through organized mutual help among the children. Greater attention is given in Soviet schools to the daily acquisition of knowledge, to an analysis of the errors committed by the students in oral answers and written work, and to the systematic work of the teachers in filling gaps in the knowledge of students. An important factor in raising the quality of their knowledge is the training of students to use this knowledge creatively in practice. For failing students, there are supplementary studies organized outside classes.

The greatest number of failures is to be found in the middle grades (5 to 8); this is due to the peculiarities of this age group (transition from having one teacher in grades 1 to 4 to having seven or eight teachers for different subjects, difficulties in formation of character, and so forth). Repetition in grades 9 and 10 appears to be exceptionally rare.

Section III PRESENT-DAY SYSTEM OF SECONDARY GENERAL EDUCATION

As already pointed out, the twentieth congress of the Communist Party of the Soviet Union adopted a broad programme for cultural construction and the communist education of workers. The congress directed special attention to the need for serious improvement in the entire system of educating the rising generations in line with Marxist-Leninist principles. This led to the law 'on strengthening the ties between school and life and the further development of the public education system in the

USSR' adopted by the Supreme Soviet of the USSR on 24 December 1958. The principal tasks of the Soviet school as defined by the law were the preparation of pupils for life and socially useful labour, the further raising of the general and technical educational level, and the training of educated people with a sound knowledge of the scientific principles of Soviet society and with communist ideals. On the basis of the law, the school system and the content and methods of educational work done in schools were reorganized.

A. EIGHT-YEAR GENERAL POLYTECHNICAL SCHOOL

The eight-year school provides universal compulsory mixed education for pupils aged 7 to 15-16 years.

Teaching is based on a combination of a study of scientific principles, technical instruction and labour training, and on the systematic participation of the pupils in the types of socially useful labour suitable to their age. The school imbues pupils with an interest in knowledge and with love and respect for physical labour, teaches them communist ethics, infuses them with the spirit of whole-hearted loyalty to their homeland, to their people, to the Communist Party, and the spirit of socialist patriotism and proletarian internationalism. By avoiding abstract methods, the school also seeks to promote the development of independence and creative initiative of the pupils in study and labour, and to stimulate technical inventiveness and experimental activity.

The curriculum of the school, as sanctioned by an order of the Minister of Education of the RSFSR on 26 August 1959, provides a higher level of general educational and technical knowledge than the seven-year school. Under this curriculum, 7,296 hours are devoted to general educational and technical subjects as against 6,256 hours in the seven-year school.

Eight-year national language schools of the RSFSR take into account special national requirements and provide pupils with the same level of general and technical education as in Russian schools. In addition, the former have improved the conditions for the study of the native language and literature and also of the geography of their region, the most important events of their past history and the present-day economic, cultural and political life of their people.

The curriculum of the eight-year school approved in 1959 affords a better solution to the problems of labour training and aesthetic and physical education. In grades 1 to 4, two lesson periods are allotted to labour education and in grades 5 to 8, three periods a week. Starting from grade 3 an additional two hours a week are devoted to socially useful work done by the pupils outside school hours. Altogether 1,315 hours are given over to labour instruction and training.

The different aspects of education and instruction are presented in more harmonious fashion. Humanistic subjects (Russian language and literature, history, the USSR constitution and a foreign language) occupy 39.5 per cent of the total teaching time (of which Russian language accounts for 25.3); sciences (mathematics, physics, biology, geography) 32.5; labour training and socially useful activity 15.3; drawing, music and singing 6.2 and physical culture 6.5. The curriculum makes it possible to standardize the study load carried by pupils and to maintain a sounder equilibrium between intellectual and physical activities.

Eight-year boarding schools and extended-day schools operate on the same curriculum. However, a different arrangement of the teaching system (independent working during pupils' own preparation periods, club or group activities, etc.) creates conditions which help to raise the level of the work done in these schools.

B. GENERAL POLYTECHNICAL SECONDARY SCHOOL (grades 9 and 10)

The aim of this school is to produce culturally developed people, brought up in the atmosphere of communist ideals, with a good knowledge of scientific principles and at the same time capable of regular physical labour. The school provides full secondary and technical education as well as vocational training, combining instruction with socially useful productive labour of pupils. Completion of the school enables boys and girls to enter socially useful work or to continue their education in higher educational institutions.

As in eight-year schools, general educational and technical subjects are studied on the basis of their close connexion with life and the practice of communist construction, and so the pupils are given a sound knowledge of scientific principles, a broad general and technical outlook, understanding of the natural laws governing the development of nature and society, and the ability to put this knowledge into practice.

The programme is based on knowledge acquired by pupils in the eight-year school. The content of general education in all types of secondary schools is identical, whereas the content of industrial training differs with the special subject selected.

The study of social sciences, more especially civics, literature and economic geography, gives senior pupils a scientific understanding of the laws of social life. The pupils are taught that social conscience is but a reflexion of the material life of society, that the main force governing societal development is the way in which a livelihood is earned, the way in which material goods are produced. They are taught that the history of the development of society is primarily the history of the actual producers of material benefits - the history of the working masses.

Through the natural sciences (biology, physics, chemistry) pupils of senior classes are taught the material nature of the physical world, the natural laws governing its development, the mutual connexion and the causal relationships of natural phenomena, their continuous development and modification. In this way, too, the study of natural sciences and mathematics helps pupils to understand the scientific bases of production.

In secondary schools, special importance is attached to giving pupils polytechnical education. The purpose here is to acquaint them with the most important branches of contemporary industrial and agricultural production, to associate them with productive work in enterprises, and on state and collective farms.

The study of basic production problems is organized differently in urban and rural secondary schools.

Urban secondary schools teaching industrial subjects include mechanical and electrical engineering.

In the mechanical engineering course pupils study machine parts and their assembly, the construction and operation of mechanisms and machinery; they become familiar with the basic materials used and how they are processed (casting, pressing, cutting), as well as with the assembling and finishing of products. By carrying out practical work in training workshops, pupils acquire the technical skills and knowledge of workmen employed on assembling, repairing and operating machines.

The study of mechanical and electrical engineering is closely linked with courses in physics, chemistry, mathematics and mechanical drawing.

Advanced classes in rural secondary schools teach the fundamentals of agriculture and cattle breeding, along with problems of the mechanization and electrification of agriculture. The school organizes socially useful work for students in production brigades in the sovkhozy and the kolkhozy where they undergo their training.

In accordance with the law of 24 December 1958, the period of instruction in secondary schools was intended to be three years, one year of which was to be devoted to industrial training. But experience showed that there was no reason to prolong industrial training. The wide range of general educational and labour training received by pupils in eight-year schools made it possible to shorten the period of instruction. In view of this fact, and of the desires expressed by parents, the Central Committee of the Communist Party of the Soviet Union and the USSR Council of Ministers adopted a resolution on 10 August 1964 to change over to a two-year course of instruction in secondary schools providing industrial training.

The education ministries of the Union republics subsequently made the necessary changes in the curricula and programmes of secondary schools. They reduced the time given to industrial training, and removed from the programme material of secondary value which had no bearing on the basic subjects taught. However, in evening (shift) schools where young persons working at jobs are given full secondary education without interruption in employment, the period of instruction has remained three years.

Greater attention has been devoted to optional subjects, to which two to three hours per week are allotted in each class from grades 5 to 10. In this way, it is possible to satisfy more fully the interests and desires of pupils for studies in different branches of science, engineering, art and various forms of productive labour.

C. EVENING SCHOOLS FOR YOUNG WORKERS AND PEASANTS

Shift and seasonal courses

The education law provides for a considerable expansion of evening (shift and seasonal) schools where pupils receive secondary education without leaving their work, which constitutes one of the most important conditions for the dissemination of secondary education among the population.

In the course of the next decade, according to the new programme of the Communist Party, incomplete secondary evening schools for young workers and peasants will also continue to give an eight-year course of education to adult workers who have finished the ordinary school.

Evening (shift and seasonal) secondary general educational schools offer those who have finished an eight-year school and are working a full secondary education and an opportunity to improve their vocational qualifications.

In schools of this type, pupils study the same range of general subjects and are given the same basic education and skills as in secondary schools offering industrial training. But twenty hours a week are devoted to study, including fifteen hours of class work, three hours of individual consultation and two hours of optional studies to improve vocational qualifications. Taken as a whole, the teaching time on groups of subjects is divided as follows: 33 per cent for social sciences (literature, history, the USSR constitution, economic geography and a foreign language), 42 per cent for natural and exact sciences (mathematics, physics, astronomy, chemistry, biology, mechanical drawing); 10 per cent for optional subjects to improve qualifications, and 15 per cent for personal consultations.

The programmes in evening secondary schools provide that the content of the instruction shall, on the one hand, be based on the industrial experience of the pupils and, on the other, improve their industrial qualifications, increase their social and political activity and raise their cultural level. Accordingly, the teaching in evening schools of all the school subjects and, above all, of physics, mathematics, chemistry, biology and mechanical drawing, is organized to help the pupils grasp the scientific bases of engineering and technology and also the organization of labour in the industry where they work.

Many adult pupils have much industrial experience along with a wide general outlook and can absorb the eight-year school programmes faster than regular pupils. Since the school year 1960/61, therefore, the RSFSR Academy of Pedagogical Sciences has been carrying out in a number of federation schools an experiment in accelerated instruction (a course in grades 5 to 8 in three years). The accelerated-instruction classes omit unimportant details and concentrate on basic facts and concepts. A considerable part of the time is devoted to independent work by the pupils and to practising skills.

The implementation of the 1958 education law called not only for a serious review of the content of education but for radical improvement in the methods and organizational procedures of instruction and education.

Soviet pedagogy regards the current methods used as means by which the teacher transmits to the pupil knowledge, skills and procedures, develops their cognitive powers, shapes their outlook on the world, and prepares them for life. Teaching methods reveal the nature of the collaboration achieved between teacher and pupil.

Different kinds of teaching methods and procedures are practised in Soviet schools. They include oral exposition by the teacher, discussion, work with manuals or books, independent work in the classroom, laboratory, study, training workshop, at the experimental station, or apprenticeship in an enterprise, on a state or collective farm, etc.

In addition to lessons, extensive use is now being made of various kinds of extra-curricular methods. They include visits to factories, practical work in institutions and agricultural laboratories, practical lesson in tackling a series of industrial and labour problems, agricultural experiments, etc. The educational effectiveness of a teaching system is considerably enhanced by posing realistic labour and industrial problems to pupils in senior grades taking courses of industrial practice in enterprises, state and collective farms. For instance, teachers of general subjects will ask their pupils to observe and explain various production phenomena: What laws of mechanics are evidenced in the operation of the crane which is used at your particular place of training? Give examples of rotary movement in the machinery encountered in your work. What are the basic chemical phenomena involved in removing rust from the surface of metal parts?

Of recent years, the types of independent work done by pupils in and out of school have been assuming ever greater importance. Schools are facing the problem of increasing in every kind of way the effectiveness of teaching procedures, something which can be achieved, primarily, by reinforcing the cognitive and labour activity of pupils. This is precisely the goal towards which the creative efforts of the foremost teachers and schools in the country are being directed.

Great attention is being paid to widening and deepening the instruction and education given outside the classroom and outside the school in the organization of which pioneer and komsomol organizations take an active part.

Every school has an extensive network of scientific and educational clubs (for physics, mathematics, chemistry, biology, literature, history, etc.), different technical clubs, studios, athletic societies, etc.

In all urban and rural regions there are centres for young technicians, farmers, naturalists, tourists, etc., Pioneer houses and palaces, and schools for music, art and sport.

These institutions help to develop the creative, spontaneous activities of young people of varying ages and their general education.

Section IV ADMINISTRATION AND DIRECTION OF SECONDARY GENERAL EDUCATIONAL SCHOOLS

The entire system of public education in the USSR is administered and directed by government departments.

The Supreme Soviet is responsible for laying down the basic principles in the field of education. Legislation on education in the Union and autonomous republics is enacted by the supreme soviets of those republics, taking into account the special features of the local population. The laws on education issued by the Supreme Soviet are binding also for a Union republic and the laws of the USSR and a Union republic are binding for an autonomous republic.

The supreme executive and administrative organ of state authority in the field of education is the Council of Ministers of the USSR, which issues regulations on educational matters on the basis, and in implementation, of the operative all-Union laws. In the Union and autonomous republics the same functions are exercised by the Council of Ministers of those republics.

The Councils of Ministers of Union and autonomous republics conduct the administration of education through the ministries of education.

In regions, provinces, national districts, towns, and areas, public education is controlled by the councils of workers' deputies, their executive committees and local public education bodies.

Pre-school institutions (kindergartens, childrens' playgrounds), general polytechnical schools and teacher-training institutions come under the authority of the ministries of education of the Union republics, which through their local organs - ministries of education of the autonomous republics, regional (provincial), urban and district departments of public education - administer all teaching or educational institutions.

The ministries of education of the Union republics make plans for developing the network of pre-school institutions, schools, teacher-training colleges, and extra-curricular institutions for children. They arrange for the establishment and reinforcement of their basic teaching equipment. They work out the curricula and programmes; approve textbooks; are responsible for the general direction of educational and teaching work, and draw up the most important regulations defining the organizations, scientific-pedagogical and systematic bases for the activities of educational workers.

The ministries of education of the Union republics guide and control the work of local organs of education.

Direct control of the operations of pre-school institutions and schools is exercised by district and municipal departments of education.

For institutions of education, a great part is played by the school inspectors of ministries of education and regional (provincial), municipal and district departments of education. The proper organization of inspection work in a town or district enables a department of education to direct each school, making allowance for all its special features. The district or urban inspector is allotted a specific territory for the purpose of exercising systematic control and direction of a group of schools.

This work is closely linked with the assistance given to pre-school instructors and teachers in their complicated and responsible tasks. Departments of education arrange counsel for all staff working in kindergartens, schools and extra-scholastic institutions.

The systematic working groups which have been introduced successfully consist of: rural branch associations of teachers of grades 1 to 4 (including teachers from a number of neighbouring schools); district (urban) associations of teachers of particular subjects; district seminars for school directors, directors of studies, Pioneer leaders, head-mistresses of kindergartens and extra-scholastic institutions.

At the meetings of these associations the most important problems arising in educational work are discussed and teaching experiences are exchanged.

The day-to-day administrative and educational direction of educational institutions is effected by their chiefs: the head-mistresses of kindergartens, the heads of primary schools, the directors of eight-year and secondary schools. The rights and duties of these directors are defined by standard regulations approved by the central committee of the trade union of workers in education, senior schools and research institutions and by the appropriate ministries of education of republics.

Educational administrative bodies in the USSR seek widespread support from Soviet society. One of the important ways of getting workers to take an interest in cultural construction is to set up committees under the local councils of workers' deputies. The latter exercise control on behalf of the community over the conditions of education and give the necessary assistance to education departments in implementing the law on universal education, improving the work and strengthening the material base of schools.

Substantial assistance to directors of institutions is given by the teachers' councils of kindergartens, schools and training colleges, as well as by the scientific councils of pedagogical institutes.

As communism develops in the USSR, the part played by society in the work of educational institutions becomes more and more important. Aid councils are set up under district, urban, regional and provincial departments of education to induce wider participation in discussion of current educational problems in order to help the schools. School-aid councils are also set up in enterprises and in state and collective farms.

The Academy of Pedagogical Sciences of the RSFSR, established in 1943, gives much assistance to public education organs in the management and direction of educational work. The academy includes the outstanding authorities in the field of pedagogical science. Its function is to help in the development of public education and in the dissemination of pedagogical knowledge among the people, to make a scientific study of the problems of pre-school education, the theory and history of pedagogy, psychology, methods of teaching school subjects in the general educational school, school hygiene and the teaching of art. Another aim of the academy is to help in the planning and organization of the scientific research work in educational science carried out by faculties of psychology, 'defectology', the private systematics of teacher-training colleges and universities. It also collaborates with specialists of republican, provincial and regional finishing institutes for teachers, and gives the necessary assistance to the educational research institutions of the Union republics.

At the request of the government and Ministry of Education of the USSR the academy draws up curricula and programmes for all types of general educational schools, after having previously subjected them to experimental tests. It participates in the compilation of textbooks and school manuals and in setting teaching requisites, and it prepares and publishes 'system' guides for teachers of all subjects.

The most important legislative measures in the field of education are drawn up with the participation of the Academy of Pedagogical Sciences. In its work, it devotes great attention to studying and generalizing the experience of the best teachers and the leading schools. Contact and co-operation with the teaching body is effected in various ways: scientific and other conferences, seminars, lectures and reports delivered by scientific workers for teachers, participation by teachers in experimental work at the academy's scientific-research institutes.

The district, provincial and central 'educational readings', which constitute a happy combination of exchanges of advanced teaching experience with their association in research by departments and laboratories of academic institutes, have assumed great importance. Teachers present reports on their experience and the best of these reports are selected for central readings. Material from 'readings' is published for wider utilization.

In addition the institutes of the academy (institutes of pedagogical theory and history; of pre-school education; of general and technical education; of industrial training; of evening schools of general education; of national schools; of psychology; of growth physiology and physical education; of defectology and school-laboratories) carry out scientific research work on the problems of individual branches of pedagogical science and practical work in the sphere of education.

Chapter 2 Vocational-technical education

INTRODUCTION

Vocational-technical training, designed to produce highly cultured and qualified technical workers for all branches of the national economy, occupies a large place in the USSR educational system and has enormous economic and cultural importance. The role of vocational-technical education is growing at a particularly high rate owing to today's rapid development of production techniques and technology, the installation of new and complex machines, the extension of automation, and the increase of technical improvements. To meet the manpower requirements of the national economy, the vocational and technical schools must turn out workers who are not only well acquainted with modern techniques and technology, but who can improve them quickly and ameliorate the production process in order to increase the productivity of labour.

Section I HISTORICAL SURVEY OF THE DEVELOPMENT OF VOCATIONAL-TECHNICAL EDUCATION

A. DEVELOPMENT OF VOCATIONAL-TECHNICAL EDUCATION UP TO 1945

At each stage of socialist construction in our country, the educational institutions providing vocational and technical instruction had to solve many problems relating to the preparation of skilled workers. These problems were brought about by the growth of industry and the rising level of production techniques and technology. By training these workers and equipping them with the knowledge needed for coping with the complexities of modern production and improving it, the schools thereby helped to accelerate technical progress.

By the beginning of the 1930s a new type of vocational-technical teaching institution had been created in Russia - factory and enterprise schools (FZU). Making their appearance between 1918 and 1921, vocational-technical schools became in succeeding years the basic type of school for preparing skilled workers for industry and transport. The schools of this nature which existed in the early years of the Soviet régime - most of them started up even before the October Revolution - were separated from production facilities and were not always sensibly sited, many of them being in agricultural areas while there were none in some industrial areas. But the FZU schools were from the outset closely linked with production work done by their pupils in enterprises.

The direction of vocational-technical education was at first carried out by the People's Commissariat for Education through the State Committee for Vocational Education set up in 1918. In 1929, however, in order to associate the training of manpower more closely with industry, the vocational and technical training institutes were transferred to branch trades departments. By that time the new factory and enterprise schools had justifiably taken the lead in preparing specialized workers. During the first three five-year plans, the schools prepared more than 2 million skilled workers: 450,000 under the first, 1.4 million under the second and more than 500,000 during the first three years of the third. These 2 million young, educated, cultured and technically well-equipped workers provided the majority of outstanding factory and workshop personnel.

However, a new stage in the country's development and a further acceleration of the tempo of industrialization posed fresh problems. In 1939/40, it became clear that skilled-labour training was lagging behind, as far as the requirements of a rapidly growing industry were concerned. Factories and workshops were experiencing an acute shortage of manpower in general and of technical specialists and skilled workers in particular.

The system of vocational-technical education instituted in the 1930s, especially the FZU schools which were to form the main source for supplying industry with young skilled workers, had failed to meet the demands of the country. Once a worker had received his training, he was automatically employed by the enterprise to which the school was attached so that the most important areas, where heavy industry was developing, were not being provided with skilled workers.

For this purpose a new system of training skilled workers had to be organized within the framework of a single state administration.

The order of the Presidium of the Supreme Soviet of the USSR dated 2 October 1940 'concerning the state labour reserves of the USSR', emphasized that the task of further expanding socialist industry called for a steady influx of fresh manpower without which the successful development of production was impossible. In these circumstances 'the State is faced with the task of organizing the training of new workers from the ranks of urban and rural youth and creating the necessary labour reserves for industry'.

The Presidium of the Supreme Soviet of the USSR recognized the need for recruiting annually from 800,000 to 1 million young people from town and country and teaching them industrial occupations.

With a view to preparing skilled workers - metallurgists, chemists, miners, specialists for sea and river transport and communications enterprises - the Presidium of the Supreme Soviet of the USSR proposed the organization of vocational schools with two-year courses of instruction.

The order provided for the opening of two-year railway schools to train persons to be railway transport workers - drivers' mates, fitters, boiler-makers, gangers and other specialized workers.

Schools for instruction in factory and workshop practice (FZO) with a six-month training course were set up to train workers for basic industries, such as ore- and coal-mining, metallurgy, oil and building.

Pupils of vocational, railway, and FZO schools receive full maintenance from the State. When they finish their schooling, the young workers must work for not less than four years continuously in state enterprises where they are paid at standard rates.

To direct the work of labour reserve schools, the Chief Administration of Labour Reserves was set up under the Council of People's Commissars of the USSR.

With the establishment of the state labour reserves a new page was opened in the history of the planned preparation of skilled manpower and a new stage began in the development of vocational-technical education in the USSR. The labour reserve schools differ from the old system of training workers through FZU schools in the following important features:

1. The entire preparation of skilled workers has been concentrated in a single state department, the Chief Administration of Labour Reserves.

2. Before 1940, the FZU schools operated on the basis of open recruitment, with the result that the scheduled enrolment plans, year after year, were not fulfilled because not enough sufficiently trained young persons were willing to enter FZU schools. By contrast, enrolment in labour reserve schools and institutes is based on a state plan. This furnishes a sound basis for planned enrolments in labour reserve schools and, consequently, a continuous flow of trained skilled workers has been secured for industry, transport and building work.

3. Pupils of labour reserve schools are fully provided with living accommodation, meals, clothing, and school requisites. In the 1930s, a large proportion of pupils left the FZU schools before finishing because they had no living quarters and insufficient material support, but in the case of pupils in labour reserve schools these problems do not exist. Not only are pupils maintained at the expense of the State but, in addition, they receive part of the funds allocated to the schools and colleges for executing production orders.

4. FZU schools usually prepared skilled workers for the enterprises with which they were associated. Pupils who finished were assigned to jobs by economic bodies and by the schools themselves. Persons completing training at labour reserve schools and colleges constitute a general state reserve of skilled manpower which is distributed

according to a special plan, thus providing specialists, primarily, for the branches of the national economy in most need of them. The system of state labour reserves thus makes it possible also to re-locate skilled manpower in relation to changes in the geographical location of the new enterprises which are being established near the sources of raw materials and the consumers of the products manufactured by them.

The first steps taken under the system of labour reserve schools demonstrated the advantages of the new system.

In the course of two to three months (October-November 1940) after the order of the Presidium of the Supreme Soviet of the USSR concerning state labour reserves, central republican and local labour reserve administrative bodies were formed, 1,549 schools and institutes (including about 900 on the basis of FZU schools, while the rest were newly opened) were organized, and a staff of qualified directors, foremen and instructors selected.

In the new vocational schools, as well as in the railway and FZO schools, skilled workers were being prepared for more than 400 trades and specialist occupations.

At the beginning of 1941, new special FZO schools with a three-month course of instruction were opened to accelerate the preparation of skilled workers for the building materials, forestry, and railway transport industries, which at that time were experiencing an acute shortage of manpower. In March-April 1941, more than 100,000 persons were admitted to these schools.

The factory and enterprise schools (FZU), which had remained during the forties under the jurisdiction of the people's commissariats and the specialized economic departments, continued preparing skilled workers for the textile, meat and dairy, and fish industries as well as for enterprises operated by communes, local industry and industrial co-operatives.

In the years following, further action was taken in the specialization of vocational and FZO schools. In 1942, specialized vocational and FZO schools were organized for power-plant workers, metallurgists and assemblers in metallurgical factories. In 1943, specialized vocational and FZO schools began training workers for factories making chemical products, mines for coking coal, and the merchant service.

During the Second World War, as part of the system of state labour reserves, several new types of educational institutions were established. For example, special vocational schools were organized to accommodate, instruct and educate the children of Red Army soldiers, of partisans, and also of Soviet officials, workers and collective farmers who had perished at the hand of the occupying forces. The entire upkeep of these children was borne by the State.

These special vocational schools admitted children of 12 and 13 years of age, left as orphans, who had the equivalent of four years of primary school education. After four years of instruction in a special vocational school, they acquired a general education equivalent to that given in a seven-year and specialized vocational training at grade 4 or 5 level.

Sixteen industrial technicums (the number later rose to twenty-two) were opened to train workshop foremen in production teaching for labour reserve schools. Thus, notwithstanding the extremely difficult war-time circumstances, the system of labour reserve schools continued developing and expanding.

During the war years, the railway, vocational and FZO schools trained 2.5 million young workers for industry, transport and other branches of the national economy.

B. VOCATIONAL-TECHNICAL EDUCATION AFTER 1945

Following the Second World War, the system of labour reserve schools proceeded to expand as part of the plan for improving the organization of teaching and the quality of skilled-worker training.

In 1946 the Chief Administration of labour Reserves was merged with the Committee for the Registration and Allocation of Manpower to form the All-Union Ministry of Labour Reserves[1] whose functions included the registration, training and allocation of the labour reserves of the USSR.

In those first years, the network of labour reserve schools was considerably expanded; an exact list was compiled of the occupations for which workers should be trained by railway, industrial art, and FZO schools. In 1946, there were 699 more vocational and railway schools, and 220,000 more pupils studying in them, than in 1945. The following year, 253 vocational and railway new schools were established for 74,700 pupils and 399 FZO schools for 89,200 persons. On 1 January 1948, there were already 4,197 labour reserve teaching institutions in the Soviet Union with 1,024,000 pupils.

The implementation of the five-year plan for the rehabilitation and expansion of the country's national economy called not only for an increase in the number of schools and pupils but also for an improvement in the training of workers for industry, building construction and transport.

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[1] Later it was changed into the state Committee of the USSR Council of Ministers for Vocational-Technical Education, which still exists.

As our industries were becoming more modern in many respects, new types of schools were needed. For children and adolescents who had been left orphans, the Ministry of Labour Reserves was instructed to organize new special vocational and agricultural schools to train field workers and gardeners as well as mechanics for power agriculture stations. The period of instruction in the special vocational schools was fixed at three years and in agricultural schools at four years.

Pupils between 13 and 15 years old who had the equivalent of three years of primary school education were admitted to the special vocational schools. Three years' attendance at the school gave them a general education equivalent to grades 4-5 of a regular school and vocational training at the same level.

Admission to agricultural schools training mechanics for power agriculture stations was granted to persons at least 15 years old who had not less than five years at a secondary school. During the period of instruction they acquired a general education equivalent to seven years in a secondary school, and specialized vocational training needed for successfully discharging the duties of mechanic in power agriculture stations.

By organizing special vocational and agricultural schools, two very important achievements were attained: the settlement in jobs of children who had been left orphans and brought up in children's homes, and the preparation of skilled workers needed in industry and agriculture.

From 1948 onwards, vocational and FZO schools began training persons for work in radio and vacuum technology.

Drawing upon the experience gained in 1941/42 in the accelerated training of workers for skills in basic industries, three-month courses were developed in 1947 to train workers in coal-mining.

Special mining schools with a seven-year course of instruction were organized for orphans of miners as well as for children of specialist workers in the mining industry, children of disabled workers and children of miners who had been distinguished for their service. They admitted pupils between 12 and 14 years of age with an education equivalent to four or five years of a general educational school. After seven years of instruction, they acquired a general secondary education and special vocational training (equivalent to the programmes taught in mining technicums).

In 1949, vocational and FZO schools which had been producing specialized workers for the coal and mining industries were converted into two-year mining industry schools and vocational schools with six- and ten-month training courses. (Five years later, a ten-month course of study was introduced into all mining industry schools.)

To improve the training of workers for the building trades, vocational schools were replaced in 1957 by two-year schools which henceforward trained most of the building specialists and machinists. Two-year trade schools were organized for electricians.

Since 1953, the training of mechanics for agriculture has been changed over to the system of instruction given in trade schools and merged with the system of state labour reserves. Previously, they had been trained principally by schools for mechanics of the Ministry of Agriculture and Supplies of the USSR. The state labour reserves system had only a small number of special vocational and FZO schools in this field.

It was obvious that the level of specialists training in the ministry's schools was inadequate. There were too few schools. Training was too specialized, so that a harvester thresher driver might be employed for only three or four months a year, a flax-combine driver for one or two months, etc. Theoretical instruction was lacking as well as proficiency in teaching procedures.

The reorganization created schools of agricultural mechanics which trained versatile machinists for work on diesel tractors, harvester threshers and complex agricultural machinery, operators of caterpillar- and wheeled-tractors, and for self-driven and trailer combines, as well as fitters able to maintain machinery used in stock-breeding etc. In the ten years to 1963, these schools trained 4 million agricultural mechanics.

In 1954, to facilitate the preparation of skilled workers and young technicians for the principal branches of industry and agriculture, 261 technicums were organized under the labour reserve system providing a level of instruction equivalent to that of complete secondary schools. From 1955 to 1963, 827,000 workers finished their studies under this system.

In 1957, twelve-year vocational-technical colleges were opened which provide general and technical education at the secondary level.

Vocational teaching institutions were reorganized into urban and rural vocational-technical schools in 1959. The urban schools train workers for different branches of industry, including building, transport and communications. The rural vocational-technical schools are the main source for supplying agriculture with skilled workers. The Soviet Union now has 1,285 vocational-technical schools as against 797 in 1954. During the next five years it is proposed to build at least 500 new rural schools. In view of the technical progress in the field of agriculture, rural vocational-technical schools keep extending the lists of occupations and specializations which the workers can learn. They soon may expand from five to fifty.

From this brief review of the growth of vocational-technical schools, it will be seen that the system of labour reserves has been continuously improving and changing in the light of the tasks the people of the Soviet Union had set themselves. It has thus constituted the basic channel for supplying skilled workers.

In the twenty-five years since the system of labour reserves was organized, the numbers of schools for vocational-technical training have increased more than 2.5 times. There are 4,237 vocational-technical schools in the Soviet Union today. In the first years of vocational-technical training, 500,000 young workers were prepared annually for the national economy in training centres and in FZO schools. During the past few years, the system of vocational-technical education annually trains 800,000 to 900,000 workers for 700 occupations and specializations. Furthermore, 9 to 10 million workers learn new occupations or improve their qualifications without having to leave work.

Schools providing evening classes exclusively, or day-time schools which include evening classes, have increased considerably. In 1965, in the RSFSR alone, more than 170 independent evening vocational-technical schools and 700 evening departments in day-time schools were active.

The Soviet people have successfully fulfilled the aims of the seven-year plan for national economic development. The new five-year plan is designed to advance the construction of communism's material-technical base. In all branches of production and public service, thousands of new enterprises equipped with the latest discoveries of science and technology, will be established, and the technical level of existing enterprises will be greatly raised.

As the entire economy of the country attains a higher level, the requirements for technical workers will increase. There will be an increase in the demand for highly skilled mechanics and house carpenters, assemblers and fitters of complex machines and mechanisms, electro-fitters and electro-assemblers, and workers in other occupations dealing with the mechanization and automation of production. In different branches of machine building, for example, the number of workers for highly skilled mechanized work will increase from 20 to 30 per cent. In the mining industry, approximately nine times more engine-men are required for excavator operations and almost three times more for mining combines. About three times more water-supply engineers and almost five times more hydraulic station engineers are needed. More and more agricultural mechanics will be required. Skilled technical workers in food and light industries, commerce, and public services are in great demand.

Consequently, new responsibilities are falling to the vocational-technical educational authorities. It will be necessary to widen considerably the network of vocational schools and to increase the capacity of existing schools.

In 1964, the number of student places in vocational-technical schools increased by 46,000 and in 1965 by 103,000 and an even greater increase was contemplated for 1966. It has been proposed that a vocational-technical school be attached to every medium- or large enterprise, or in the case of a very large enterprise, several schools.

The success of the vocational-technical educational system is due to the great number of monitors in industrial training, as well as instructors and educators. At present, 118,000 monitor-trainers are engaged in the vocational-technical educational system. More than half of these have higher education while 60 per cent of the instructors have secondary education.

The teaching staff in the vocational-technical schools is systematically filled by persons having completed higher and secondary specialized education. Many instructors and monitors follow courses by correspondence, or in evening schools and technicums, or else improve their qualifications by means of refresher courses.

Section II ON-THE-JOB TRAINING AND IMPROVING THE QUALIFICATIONS OF WORKERS

Alongside the system of labour reserve schools and FZO schools, the USSR has witnessed an expansion of varied methods of giving technical instruction to new workers and improving the qualifications of the others based on the experience accumulated in imparting technical instruction without a break in production.

In the first post-war five-year plan for the rehabilitation and development of the national economy of the USSR (1946-50), the government approved a plan for educating 21.6 million workers directly in factors without interrupting their work.

For new workers in industry, the network of courses and schools giving instruction without break in employment was considerably expanded. Individual and team instruction given in factories was widely employed as the most flexible and large-scale method of conveying basic knowledge. Some firms developed special production-teaching sections for intensive instruction of new workers. Thanks to this direct individual and group teaching, factories which had to be transferred to the east during the war with only 10 or 20 per cent of their working force intact were able to train new workers rapidly, and then reach even higher levels of production. At present, we have thousands of enterprises in which more than half of the workers and employees are being taught and are improving their skills.

The higher qualification of workers is the most important condition for fulfilment of the production plan, the full use of existing production capacities and the exploitation of new objectives at a timely stage.

The planning of vocational-technical education of staff begins with an estimation of additional workers needed, based on the strength of the present working staff, the designation of occupations and specializations, the time it actually takes before a worker begins productive activities, and the length of his period of study. At the same time, the qualifications of the working staff are reviewed. On the basis of this data, each enterprise draws up its plan for training and for improving qualifications.

A. TRAINING OF NEW WORKERS

The training of new workers and the teaching of new occupations and specializations to workers changing their jobs take place on an individual or group basis. Courses are given while the trainee works, or on a full-time basis, during a period generally lasting not more than six months.

Full-time courses are given only when the enterprise cannot provide conditions for on-the-job training. Such courses are usually organized to teach particularly complex occupations requiring the assimilation of much theoretical knowledge.

The training given to working staff attending courses - whether individually or in groups - includes the study of production methods along with the compulsory study of theoretical principles. This provides workers with good working habits as well as the technical knowledge necessary for today's production activities involving mechanization and automation.

Experience shows that when highly skilled workers are chosen as instructors in production training, and when foremen, shop superintendents, and other technical engineers in the enterprise teach theory, the qualifications of workers having terminated individual or group training fully satisfy the requirements of production.

The training programmes are approved by the State Committee of the Council of Ministers of the USSR for vocational-technical education, or on authority of local organizations for vocational-technical education.

B. IMPROVING THE QUALIFICATIONS OF WORKERS

Courses on production technique are given so as to improve the qualifications of workers having taken individual or group courses in the enterprise, and of workers who come out of vocational-technical schools. The courses are so organized as to improve systematically their skills, and to give them training which includes the elements of engineering-technical preparation, necessary in the enterprises.

These courses have different aims, depending on the needs of the enterprise and the plan for the improvement of workers' qualifications.

Group a. To improve workers' qualifications and to give them the technical knowledge necessary to cope with advanced technology and the means for attaining a high level of production.

Group b. To teach the use of new equipment and materials, so that workers become acquainted with new technological processes used in production and the methods of mechanizing and automatizing production and control processes.

Group c. To teach workers secondary skills

Table 3. Production rate before and after training in three industrial enterprises

Enterprise	Occupation	Number of trainees	Rate of production	
			Before training	After training
Vyshnevolotsky textile enterprises	Deputy overseer-spinner	73	105.6	107.3
	Deputy overseer-weaver	40	104.5	105.3
	Weaver	25	102.6	105.3
'Proletarian Avant-garde' textile mill	Fitter-repairman	18	101.2	110.0
	Fitter-reeler	26	103.0	114.3
	Joiner	17	119.0	127.8
	Deputy overseer-weaver	103	99.9	101.4
Bolshevsky machine-building plant		46	117.0	119.0

Note. The number of products sent back by the Office of Technical Inspection because of manufacturing defects decreased from 7 to 5 per cent

completing their principal ones, to raise the production average of each worker in order to improve the over-all work system, and to combine occupations according to the needs of production.

The duration of production-technical courses in group 'a' is determined by the management in enterprises and organizations, depending upon the complexity of the occupation, with limits of not more than six months for study without terminating work, and not more than three months for full-time study.

In group 'b', the length of study is determined by the content and the volume of the educational programmes but is not to exceed two months.

The work schedule is conditioned by teaching plans and programmes. Studies include theoretical subjects, production training, and instruction at the place of work. These courses for improving the qualifications of workers help enterprises solve problems of assimilation of new techniques and progressive technology, raising productivity, and improving the manufactured product.

Table 3 provides the example of a few industrial enterprises. (The production rate shows an average for each group of occupations.)

Courses in group 'b' were taken by 439 persons in the Vyshnevolotsky textile enterprises, 400 persons in the 'Proletarian Avant-garde' textile mill, and twenty-five persons at the Bolshevsky machine-building plant.

The production of those who underwent training in the two textile enterprises increased on an average from 1.5 to 5 per cent, and at the Belshevsky plant, the number of defects in manufacture was reduced by half (from 4 to 2 per cent).

In group 'c', the training given for a second or combined occupation plays a major role in improving workers' qualifications.

Workers who have been trained for a number of occupations can always replace someone who is absent, or in the case of an acute need, change to other posts.

This combination of occupations permits better utilization of machines, shortens the idle time of equipment, and lengthens its continued use. Thus, there is an economy in the use of the labour force, work production is increased, and an uninterrupted process of production is guaranteed.

In the enterprises mentioned in table 3, the training of workers in second and combined occupations was carried out in 1965. In the Vyshnevolotsky enterprises, 150 persons were trained, and in the Proletarian Avant-garde mill, fifty-two persons were trained. For example, women in charge of supplies learnt to be weavers; weavers learnt to be raw materials inspectors, winders learnt to be warpers, and so on.

C. SCHOOLS FOR LEARNING THE LATEST WORK METHODS

Schools for learning the latest methods of work were created to spread and inculcate the progressive techniques of industrial innovators who were able to obtain the highest indices of productivity, better quality, lower costs, and economy of materials.

Teaching consists of practical demonstrations and lectures by innovators of the latest methods. Specialists also give individual advice.

These schools, as a rule, are attended by workers of a single profession and can be departmental, inter-departmental, or inter-factory.

The course is considered terminated when the registered workers have grasped the new techniques, have raised their productivity, improved the quality of the product, or reached other production goals set in advance.

The results for workers on a per-item basis at the three enterprises mentioned above can be seen in table 4.

Thus the data show that the vocational-technical education of workers given in enterprises

Table 4. Production rate of piece-workers before and after training in three industrial enterprises

Enterprise	Occupation	Number of trainees	Rate of production	
			Before training	After training
Vyshnevolotsky textile enterprises				
	Spinner			
	Leveller	252	102.3	104.0
	Weaver	61	104.0	105.0
	Deputy overseer	94	98.6	103.0
	Winder	38	105.0	106.6
'Proletarian Avant-garde' textile mill		6	96.7	105.2
	Spinner			
	Surveyor	153	99.0	103.9
	Leveller	60	98.1	103.0
	Ribbon maker	20	93.5	102.3
	Weaver	5	98.3	101.3
	Loader	78	97.8	101.3
Bolshevsky machine-building plant [a]		85	98.3	101.7

[a] In 1964, 40 people finished the school for learning the latest methods of work. Productivity increased on an average 6 per cent

has reached the desired goal and contributes positively to the fulfilment of current and long-term industrial plans.

We presented the résumé of the results in three enterprises, but if we take the volume of training and requalification of staff on a larger scale, the results are impressive. In 1965, to take one example, more than 60,000 new workers were trained in the Moscow region in different kinds of courses and schools. The qualification of approximately 168,000 other workers was increased. From the above data one can see that the system of technical education of workers is sufficiently well organized and flexible and that it foresees the diverse needs of enterprises in terms of trained workers.

Technical training stimulates workers' initiative and inventiveness for the rationalization and improvement of production. One can trace the growth in the number of inventions, improvements and suggestions for rationalization in industry, to the rise in the cultural and technical level of workers and the expansion in technical instruction. Every year, hundreds of thousands of inventions and rationalization suggestions are absorbed into industry. In the period from 1950 to 1963, more than 11 million inventions and suggestions for rationalization were put into effect.

Thus, there is a direct connexion between the development of techniques or new methods of work and a rise in the scientific and technical level of the workers.

New and more sophisticated technical knowledge creates demand for higher labour productivity, and new methods of work. The scientific and technical instruction imparted to workers, the complete mastery of advanced production techniques and technology satisfies these needs. This, in its turn, promotes the further development of technical knowledge.

Section III

ORGANIZATION OF STUDIES IN SCHOOLS AND INSTITUTIONS OF VOCATIONAL-TECHNICAL EDUCATION

The whole teaching process in vocational-technical schools and colleges is based on compulsory curricula and programmes. Moreover the approved length of time fixed for each subject must be followed strictly, as is the case for the programme of study for each subject. For example, the curriculum of a vocational-technical school based on incomplete secondary education comprises the following subjects:

Production studies: 60 per cent or more of the total number of teaching hours.

Specialist-technical subjects such as specialist technology, knowledge of materials, general technology of metals, mechanization and automation, economics and organization of production, and drawing: 20 per cent.

General educational subjects such as physics, mathematics, native language, elementary mechanics, electrical technology and industrial electronics, basic political, aesthetic and physical education: 20 per cent.

The system of vocational-technical education thus has two aspects: practical and theoretical. At the end of their training, the students should have acquired good work habits and experience, as well as sufficient theoretical knowledge and, above all, a good polytechnical training.

A. PRACTICAL TRAINING

Study of production in workshops and teaching sections

During production training, students master a profession, study the latest modern techniques and become acquainted with the technology and organization of production. Training in workshops and sections is conducted principally by lessons which include an introduction, main part and conclusion. In each part, the foreman who gives the lesson follows the same procedure.

The introduction explains the purpose and method of the work assigned, and demonstrates techniques and ways of handling materials. During this period, the students revise work done earlier, acquaint themselves with technical documents (mechanical drawings, instructional and technical plans) and with the technical requirements for the product.

After the explanation of ways of achieving quality control and rules of safety, a trial period begins during which students learn to fulfil norms, to carry out the operations they have been taught, and to check what they have learned.

Since the aim here is to complete complicated production assignments, special attention is paid to the analysis of the technological process, to technical requirements and to the industrial documentation the worker may have to consult.

The students are already capable of carrying out many basic operations. For this reason, the foremen demonstrate and explain only those methods and operations which will be newly encountered. The purpose is to render timely help to students in the fulfilment of their production tasks.

Day-by-day instruction forms the skills and habits of students. The process is uneven, because the method takes into account the individual capacities of each student. Foremen follow attentively the way in which students accomplish their assignments and help them when they need it.

During the training process, the foreman finds out whether the students have mastered and put into practice the instructions they were given, whether they are making mistakes, how they organize their particular tasks, whether they observe the rules of safety, and whether they make intelligent use of materials, instruments and equipment.

At the same time, the foreman teaches the students to control and analyse their work independently, to correct errors and to overcome difficulties.

The concluding part of the lesson sums up the results of the production training. During this period, the course itself is analysed, as well as the progress the students attained, the errors made, difficulties encountered, defects shown and the reasons for this. The foreman gives an appraisal of the work done by the students, analyses the mistakes and shows how they can be avoided in the future.

Weight is attached not only to the final results and the habits and skills acquired, but also to the diligence of the student, his attitude toward the tasks and toward the instruments and materials.

B. ORGANIZATION OF THE EDUCATION OF STUDENTS IN ENTERPRISES

The main emphasis in training students is on improving professional habits, as well as on widening and deepening their technological knowledge, the accumulation of experience in advanced production and in the accomplishment of independent work after completing school.

The students must learn to use the various types of the most recent industrial equipment in factories, construction industries or mines, and to master the methods necessary for continuous and productive maintenance of this equipment.

The organization of teaching during the training period in the enterprise takes place in the following principal ways: (a) group training in individual training sections; (b) group training in production sections; (c) the fulfilment of production tasks by students working within groups of skilled workers; (d) the training of individual students to use different machines.

The type selected depends on the form in which the workers have organized their work in the occupations which the students are learning.

The training of a group in especially chosen production sections affords the best possibilities for the systematic completion of the training programme. When this is impossible the foreman divides the group into sections.

Sometimes students are included in production teams of skilled workers. This is done only when it would be impossible or unrealistic to organize group training. Furthermore, this requires assiduous leadership by the foreman and constant contact with the workers in the teams where the students are training. After two or three months, the students can accomplish regular production tasks.

The experience of working in regular positions teaches the students production conditions and improves their individual work. Although the conditions of work for students in regular working places should not be essentially different from that of skilled workers, the foreman continues to play an important role in the training.

Students change jobs according to a time-table set by the foreman in charge of training. The timetable allows each student to assimilate different techniques and to learn the most characteristic aspects of his speciality, in accordance with the existing standards for skilled workers.

Production training represents a complicated many-sided process requiring very careful planning. In vocational-technical schools, the following plans are used: (a) a list of production tasks to be performed as training exercises during one semester; (b) a plan of the production activities of the school for a calendar year· (c) a monthly plan for groups; (d) a daily plan for foremen in charge of production training. An essential element is the control of production training. This control can reveal how fully teaching programmes and plans are followed. It can also show the quality of knowledge, the skills and habits of the students and the school's fulfilment of production training. Are the students following their schedule or are they falling behind? Do the contents, sequence and quantity of material learned correspond to the requirements foreseen?

In order to check progress, each foreman keeps a journal which notes the material taught, the assignments fulfilled by students and the time spent on each subject and on each task.

The control of student progress is done on three levels: current, periodical and final.

Current control. This takes place each time a student completes an industrial production task which deserves recognition.

Periodical control. This occurs at the end of each semester in the form of test-work. Students are given exercises to verify the knowledge, skills and experience acquired during the semester. These examinations are given at the time foreseen by the work plan and programmes of production training. Subjects are chosen by the head foreman and are discussed by a commission on teaching methods.

To ensure that test-work is carried out correctly, the school director picks an assistant in addition to the foreman to see to it that the conditions set are observed.

Before test-work begins, the foreman announces the subject and the contents of the work to be done, then explains how it is to be done, the time-limits, and other details. On the basis of this, the students set out to do their work independently without help from anyone.

When students have completed their test-work, they give it to the foreman, who notes when the work was handed in and calculates the length of time spent on the assignment. His assistant also notes these times.

The final control. This takes place at the end of the year and at the end of the training period and takes the form of final examinations and trial work.

The final qualification examinations reveal the preparation of students for production work in industry and determine what grades or salary they deserve. They are held when students have completed production trial work and consist of written and oral tests.

Qualification trial work is selected by the foreman and the head foreman of the school, together with the heads of those departments where the work will take place, after discussion at a meeting of the training unit. This work should correspond, as a rule, to that of the established programme. It follows the technical needs and norms found in the enterprise and cannot last less than one day.

As much as possible, vocational-technical schools pattern their training on skills needed by different enterprises and in accord with technical and technological requirements.

A wide range of skills are being taught today. They are distinguished by a considerable increase in the importance of highly specialized manual or mechanical skills. For this reason, many vocational-technical schools cover a wide gamut of techniques and teach supplementary skills so that students can perform several different jobs. This enables workers to fill different positions in a single technological process, at the same time that they are able to contribute other skills. Increased mental capacity is required as well as knowledge of elementary engineering. The training of these workers is thus based on an extensive general, polytechnical and specialized education. Taking the coal industry as an example, the growth of mechanized and automated processes and the increase in mechanized work have made it necessary to increase general and specialized training, and to train workers in a broad range of activities. Four-year mining vocational-technical schools have been and are being organized in the principal coal pits. Graduates of such schools know the principal mining operations, have the necessary skills to assemble, adjust, service and repair mining machinery and automated units.

However, it does not follow that at the present stage all branches and enterprises train workers in a wide range of activities or in supplementary skills. Need and the development perspectives of a given industry or enterprise determine the training. To do otherwise would not help output. Due weight must be given to the actual requirements.

C. CONCLUSION

To provide complete, diversified training for young workers, the labour reserves should follow state targets designed to raise the cultural and technical level of labour. They are discovering new solutions in which practical applications are tightly linked with theory.

Current developments in production, along with social, scientific and cultural advances, make the training of young people for work in the various branches of the national economy exceptionally important. For this reason special attention is being given to problems of further developing the vocational-technical education, and also to the problems of transforming factory-workshop training schools and trade, railway, mining, construction and other schools into urban and rural vocational-technical colleges on the basis of eight-year schooling and complete secondary education. This task is particularly important in view of the need for workers with a higher level of education for new industries, such as radio-electronics, synthetic materials, automation apparatus, and remote-control machinery.

Since our country has universal, compulsory eight-year education, admittance to schools of vocational-technical education is open only to persons with eight years of education. Pupils leaving these schools and colleges will take examinations for a diploma in full secondary education. In this way, vocational-technical schools will gradually become secondary specialized educational institutions, equivalent to technicums. A number of the branches of production training schools operating in enterprises (e.g. schools for foremen) will also give workers an equivalent to a full secondary school course. All this means that the existing gap between different types of schools will gradually be eliminated.

Chapter 3 Secondary specialized education

Section I ROLE AND GENERAL ORGANIZATION OF SECONDARY SPECIALIZED EDUCATION

Secondary specialized education has great significance in the USSR. The secondary specialized educational institutions do more than raise the general educational level of the working class and the collective farm peasants by assuring them full secondary education. They also mould fresh groups of intelligentsia.

In the secondary specialized teaching institutions, the future specialists are given a general educational training which corresponds approximately to the secondary school programme. In secondary technical institutes some biological subjects are not studied and there are certain differences in the programmes for mathematics, history and other subjects. Nevertheless, the study of general educational subjects plays an important part in shaping the intellectual development of future specialists.

Along with this general educational knowledge the future specialists are taught present-day science in the specialized field they have chosen, and they also acquire skills in practical work on modern machines. Furthermore, they receive broad polytechnical training, including the principles of electrical and mechanical engineering and other scientific or technical subjects. This enables them to find their bearing more easily in science and, in the course of future practical work, to solve the technical problems confronting them. Specialized training is based on a high level of general educational and polytechnical training. This gives the students a more profound knowledge and a sense of reality, and the link between the whole teaching process and productive work helps to form an all-round specialist. These institutions are extremely popular with young people. In most secondary specialized educational institutions admission is by competitive examination. Graduates of secondary specialized educational institutions who, in the course of twelve years (eight-year plus technicums) have completed their secondary general and specialist education, have proved to be very successful. In present-day conditions of developed production, they play an increasingly important role as organizers of production and as workers who are directly producing material goods

The expansion of the system of secondary specialized education is being increasingly stimulated by the growing demand for workers who possess these skills. At present, the proportion of persons with secondary technical education in certain enterprises is very high.

The Soviet worker is playing an increasingly active role in society, and mainly in the direction of industry. He must be an educated and cultured person. Consequently, the cultural and technical level of the workers cannot be regarded as an 'automatic' result of the development of technology. It is determined by the relationship of production to society. A socialist society makes culture and education the property of the broadest masses of the workers and vivid evidence of this is to be seen in the wide development of secondary specialized education in the country.

In tsarist Russia there were only 450 secondary specialized educational institutions, situated in 137 towns and giving instruction to 54,300 pupils. Moreover, throughout the vast territory of Siberia only one secondary technical school or college, situated in Irkutsk, was to be found. Today, there are secondary specialized educational institutions in almost all of the small towns of Soviet Russia. By 1964/65 their number had reached 3,700 and their total enrolment 3.3 million pupils. This type of education has developed particularly widely in the national republics.

In addition to full-time secondary specialized educational institutions there exists an ever-increasing number of part-time training facilities. This type of training is provided by correspondence and evening technicums which have their own branches and study-consultation centres, and also by the correspondence and evening school departments of day-time secondary specialized educational establishments. At present, the country has 260 independent evening technicums and fifty correspondence technicums, as well as 1,125 evening departments and 1,877 correspondence study departments, with a total number of 1,691,000 pupils.

Major advantages are offered by the State to workers studying in secondary specialized educational establishments without interrupting their employment. Specifically, over and above the regular annual vacations, pupils in the junior courses of evening schools are given ten extra days and those taking correspondence courses a month's vacation, while pupils in the senior courses of evening departments get twenty days and those in correspondence course departments forty days. When they prepare for final examinations these pupils are given two months' leave from work, and even during the additional vacation periods they are still paid. This is very important for the further expansion of the system of training specialists without having them interrupt their jobs. In day-time technicums all pupils making progress in their studies are given a government scholarship and those coming from other towns are also provided with lodging in a communal hostel.

Workers and collective farm members make up the predominant number of pupils in secondary specialized educational establishments. In 1963, workers and collective farm members undergoing all forms of education constituted 69 per cent of the total number of pupils and in the case of day-time instruction 73 per cent (44 per cent workers and 29 per cent collective farm members). In the case of correspondence courses and evening schools, workers and collective farm members constituted 66 per cent.

As a consequence of great attention and care, the Soviet government, educational establishments and their teachers' associations have developed in our country a system of labour and technical education which makes it possible to train a rising generation capable of mastering modern techniques. Young persons can translate into production the achievements of modern science, participate in the development of production and, through the latter, in the development of science and technology from the very beginning of their professional life.

The present system of secondary specialized education in the USSR includes technicums and other secondary vocational educational establishments with differing specializations: industrial, economic, transport, communications, construction, agricultural, technological, medical, pedagogical, art criticism, etc. both in day-time and in correspondence and evening classes. Technicums train specialists with secondary qualifications: electricians, mechanics, planners, statisticians, commodity specialists, as well as agricultural and stock-breeding engineers.

There are also secondary specialized educational establishments, of equal status to the technicums, which are termed schools (medical, pedagogical, musical and art schools, etc.).

Secondary specialized educational establishments admit persons of both sexes, aged from 14 to 30, with an education equivalent to at least eight years of a general educational school, who have passed entrance examinations. For individual special trades, the requirement is general complete secondary education.

The regulations and procedures governing admission to technicums are basically the same as those for admission to higher educational institutions. They will be dealt with in greater detail in the next chapter. The admission regulations stipulate priority for the best prepared production workers. Enterprises, construction units, state and collective farms may send their young workers and collective farmers who are, theoretically and practically, best prepared. A new criterion has been inserted into the admission regulations both for universities and technicums to ensure the recruitment for these institutions of young people who are not only intelligent and have a good knowledge of scientific principles but also have been trained for practical work. This is because they typify the basic purpose of the teaching process - the combination of higher education with science and production, and the broadening of the links between school and life, with ever more active participation in the creative activities of the Soviet people.

Secondary specialized educational establishments have at their disposal laboratories, workshops and offices.

Students graduating from technicums sit for state examinations or defend a thesis for a diploma and, on completing their studies, obtain employment in their specialities.

Following are the types of training given in secondary specialized educational establishments.

Training given without interrupting production work

1. Correspondence schooling to which are added class lessons and laboratory work.
2. Evening classes, which, in fact, may be given in the evenings or day-time, depending on the shift hours worked by students.

Training given with interruptions in production work (day-time)

1. Senior courses in certain special trades in industry, transport, building construction and communications which are accompanied by a one- to one-and-a-half-year work period during which students take correspondence or evening study courses.
2. Classes in public health, physical culture, in-

struction, economics and art which are accompanied by obligatory training in the field.

3. Classes to train specialists in agriculture, geology and in seasonal work which alternate theoretical and practical lessons with work on model farms, state or collective farms and in enterprises, organizations and institutions.
4. Classes which alternate theoretical studies with productive labour throughout the whole period of tuition.

The periods of instruction in secondary specialized educational establishments training skilled workers who have had an incomplete secondary general education (eight-year schools) are fixed at from three to four and a half years. If they have had complete secondary schooling the limit is one to three and a half years.

Section II

ADMINISTRATION OF SECONDARY SPECIALIZED EDUCATIONAL INSTITUTIONS

Secondary specialized educational establishments are the responsibility of USSR ministries and government departments, Union republic ministries, and the executive committees of councils of workers' deputies.

These authorities exercise their control on the basis of the general regulations drawn up by the Ministry of Higher and Secondary Specialized Education of the USSR.

Secondary specialized educational establishments are opened, reorganized or closed by agreement with the Ministry of Higher and Secondary Specialized Education of the USSR and the USSR Ministry of Finance.

For institutions under the aegis of republics and local authorities, operations follow procedures laid down by the council of ministers of each Union republic.

Correspondence course and evening school departments and scholastic advisory centres in Union republics are under the jurisdiction of the USSR ministries and government departments with advice from the Ministry of Higher and Secondary Specialized Education of the USSR. Where the schools are under the direction of republics or local authorities, decisions are made by the ministries, departments and executive committees of councils of workers' deputies, in agreement with the administrators of higher and secondary specialized educational establishments in the Union republics. The same system is used in introducing or discontinuing instruction in a special skill.

Secondary specialized education schools may include: sections (evening school, correspondence courses and day-time tuition), committees on methodology, branches, consultation centres, classrooms, laboratories, model industrial workshops and departments, model industrial farms, libraries, athletic centres and installations and also other auxiliary pedagogical and administrative sub-departments.

Methodology committees are designed to improve teaching and educational work and consist of not less than five teachers who give demonstrations in one or several related subjects.

Branches are situated in another town or area and operate independently to bring the school nearer to the place where the pupil works or lives.

Consultation centres assist students taking correspondence courses in their independent work.

They all follow regulations approved by the USSR Ministry of Higher and Secondary Specialized Education.

A secondary specialized school has a director appointed by a ministry, government department, council of national economy or the executive committee of the council of workers' deputies under whose jurisdiction the establishment comes. He is chosen from specialists who have the necessary education and experience in teaching and in industrial work.

As a one-man manager the director exercises control over the entire activity of the school.

He is responsible for: the admission and graduation of pupils; the selection and proper utilization of teachers, auxiliary teaching staff and administrative personnel. He controls the organization and execution of curricula and programmes; arranges the political education and mass-culture work done by teachers; watches over the physical education and state of health of pupils, as well as social services for both pupils and employees. He is responsible for controlling the model industrial workshops to see that labour safety rules and standards are observed; directing the placement of young specialists leaving the school; seeing that school funds and property are properly managed and that official financial and recruiting procedures are observed.

The deputy-director of studies is appointed on the nomination of the director and is responsible for the educational and methodological work, for industrial training and for improving the quality of teaching. He looks after efforts to improve the skills of specialists already employed in the various branches of the national economy, culture, instruction and public health.

The director of a secondary specialized educational school is chairman of a pedagogical council which examines problems of teaching methods, production training, physical education of pupils and other questions.

Other members of the council include the deputy-director, the directors of the methodology committee, the teachers in charge of branches, departments, consultation centres, the superintendents of workshops, the directors of production training, the librarian and representatives of the social organizations in the school.

The regulations of the pedagogical councils are approved by the USSR Ministry of Higher and Secondary Specialized Education.

The social organizations group pupils, teachers, auxiliary teaching staff and other employees.

Section III

ORGANIZATION OF TEACHING IN SECONDARY SPECIALIZED EDUCATIONAL INSTITUTIONS

Training in secondary specialized educational establishments follows established curricula and programmes.

The curricula are approved by the Ministry of Higher and Secondary Specialized Education of the USSR in agreement with the bodies administering the institutions. The same ministry approves all other teaching methods and documentation. This includes: lessons; lectures; practical studies; laboratory work, planning of studies; consultations; teaching and production practice; production work, and independent studies by pupils.

Each secondary specialized educational institution is attached to an enterprise, organization or institution whose work corresponds to the skills being studied.

On-the-job training pupils are paid regular workers' salaries.

Students taking correspondence courses submit written or oral reports which are marked by their teachers.

Progress and conduct of pupils are evaluated by a system of marks: '5', '4', '3', '2', '1'. The highest mark is '5' and a '3' is passing.

The educational year in secondary specialized educational establishments begins, as a rule, on 1 September and is divided into two terms: autumn and spring. Depending on the curriculum, there are two holiday periods per year: in winter and summer, generally for a period of eight to ten weeks.

For each semester the director sets a fixed time-table of studies and also calendars for the practical and other types of work done by pupils. General teaching problems, i.e., length of terms, holiday periods, method of estimating progress, compilation and approval of time-tables, etc., are identical both for universities and technicums.

Since the adoption of the law of December 1958 'on strengthening the ties between school and life and the further development of the public education system in the USSR', secondary specialized educational establishments have been using new curricula. Pupils must participate in socially useful work and acquire necessary theoretical and technical training.

Basic electrical engineering and principles of automation and mechanization of production have been introduced into the curriculum. In recent years, courses have been organized for training persons as technicians to manufacture semiconductor apparatus, operate automation systems, mechanize and automate various branches of production, as well as specialists in programming and production of electronic computers.

Radical changes have been made in the content and form of production training in technicums. Pupils must acquire skills in one of the working trades being studied and must accept employment for a specific period. In most technicums, training is given both in the model production workshops of the technicums and in industry. Pupils make lathes for cutting metal, complicated tools, individual machine assemblies, instruments, footwear, clothing. They also build houses and other structures; future communications workers lay down telephone and telegraph lines. Direct participation in productive work instils a sense of personal responsibility for the general cause and helps to produce lofty ideals in the rising generation.

It is of great importance for the education and training of future specialists that their school work be closely associated with life and with the needs of industry. Not infrequently, graduating theses treat work problems and the more valuable suggestions are put into effect. For example, the State Examining Commission of the Moscow Electrical Engineering Technicum of the Moscow Municipal Executive Committee adjudged 215 of the theses to be of practical value and recommended that twenty of them be registered with the Committee on Discoveries and Inventions under the USSR Council of Ministers.

In a number of republics the bodies responsible for directing secondary agricultural schools and technicums have in recent years done a great deal of work to improve the training of secondary school specialists.

In the process a new type of specialized school, the 'sovkhoz' technicum, has emerged, especially in the Moldavian SSR. Experience in these schools shows a very close organic connexion between training and practical agricultural production.

Many technicums have set up industrial farms in which all the basic operations are executed by pupils under the direction of teachers.

Section IV

ROLE OF THE TECHNICIAN IN PRODUCTION

It is important to make rational use of technicians, i. e., specialists with secondary specialized education, and to know their functional role in production. Technicians have three main functions to fulfil in production: (a) they are the principal organizers and technical leaders in the primary stages of production; (b) they can provide immediate servicing of automated and other main machinery; (c) they are assistant engineers.

First function

The function of principal organizer appeared simultaneously with society-operated production. As this production developed and became more complicated, the role of the principal organizer changed.

When production used only manual labour, when the technique of making articles involved only a small number of operations and the list of these articles was limited, the principal organizer primarily assigned the work to be done by trained workers and checked their work. All he needed to know was how articles were made.

With the development of machines, the work of the principal organizer became as complicated as the manufacturing techniques. He must also be a leader who can give technical guidance in the primary stages of the production process. Taking account of the conditions which socialist industry imposes upon him, he must ensure rational usage, encourage ingenuity and socialist emulation, look after technical safety, interest himself in the general use and diffusion of the latest methods, and the organization of work.

At present, in industrial enterprises, in construction areas, in sovkhozes and kolkhozes, hundreds of thousands of technicians and other specialists with secondary education work as leaders of the primary stages of production. In the chemical industry, for example, 56.5 per cent of the head foremen are specialists with secondary education; in non-ferrous metallurgy, 50.2 per cent; in the textile industry, 48.8 per cent; in the ferrous metals industry, 45.5 per cent; in electrical and thermal energy, 43.8 per cent, and in the oil refining industry 43.6 per cent.

A larger number of specialists with secondary education work as heads of teams, sections, areas, or departmental laboratories. The percentage of technicians in these positions in industry generally is 42.6 per cent (including 50.2 per cent in the chemical industry, 49.4 per cent in electrical and thermal energy production, 44.6 per cent in the fur, tanning and shoe production industries, and 44.1 per cent in non-ferrous metallurgy). In construction work, 48.3 per cent of the positions of head superintendents and superintendents, of head foremen and foremen, are occupied by specialist technicians.

As the organization and the technology of production is perfected, the use of specialists with secondary education as principal organizers and technical leaders of the primary stages of production will be expanded.

Second function

In the second stage of material production specialists put immediately into operation automated machines and other major equipment.

This is a new function. It appeared only with the introduction of the kind of machine apparatus and equipment which fundamentally changed the character of work and the technical requirements of workers. Since then, the narrow professional differences have been eliminated, and jobs requiring heavy physical work have disappeared; in place of highly specialized professions, positions of a broader scope and requiring other qualifications have appeared. In machine building, for example, by combining machine operators, metal and electrical repairers a new profession of adjuster of automatic assembly lines was created. Coal hewer and loader skills were also merged. From 1925 to 1954, the number of mechanics increased sixteen times, the number of adjusters of machine-tool and automatic machines forty-four times and the number of assemblers (electric equipment) forty-three times.

Scientific-technical progress will continue this process at the same time that old specialities of a purely manual character disappear.

As professions change, the functions of the workers also change. Before, a worker took care of one machine doing a limited number of industrial operations. Now he must take care of a series of machines, instruments and apparatus, and of automatized production lines which accomplish a variety of industrial operations.

Automated systems, as a rule, consist of interacting mechanical, electrical, hydraulic and often electronic machines. This means that workers must have theoretical and practical training, of a level not lower than that of the secondary specialized school. A new type of worker is appearing.

We cannot treat such a worker as an engineer, because he fulfils the functions of a worker. At the same time, he is not a worker in the old sense, for he employs a significant degree of intellectual endeavour, and his functions presume special scientific knowledge.

A study of employment of specialists with secondary education shows that they are the ones who run automatic and other complicated equipment. As a result they are the controllers in instrument making and radio manufacturing; the adjusters of automated assembly lines; the adjusters of machine tools in the programmed management of machine building; the steel workers servicing open-hearth furnaces and automatic blooming mills; the operators of the main control panels directing the continuous pouring of steel; the operators and instrument workers in the chemical industry, and so forth.

At the present time, 51.3 per cent of all specialized jobs in our oil refining industry are occupied by technicians, 37.5 per cent in iron metallurgy, 28.8 per cent in the chemical industry, 26.6 per cent in non-ferrous metallurgy, 24.8 per cent in branches of electrical and heat energy production, 24.7 per cent in the oil extracting industry, and 19.9 per cent in industrial mills. This means that one worker in five in the Soviet Union with secondary specialized education occupies a position of direct responsibility.

By 1980, approximately three-quarters of all workers will deal with machines (instead of the one-third at the present time). Specialists with secondary education will be used on a large scale to operate automatic equipment and other important machines, and their role as principal organizers and technical leaders of the primary stages of production will diminish.

At the same time, the function of the technician will be passed on to specialists with higher education. In fact, industry will require that workers have ever-higher qualifications.

Third function

The third function of production specialists with secondary education is that of auxiliary engineers.

Scientific technical progress and, above all, the complex mechanized and automated processes of production have raised the role and meaning of technical training. Projects, research work, scientific investigations, experiments and the elaboration of new technical processes are increasing.

As a result, the number of specialists engaged in the technological preparation of production has also increased. At the end of 1963, 535,000 engineering-technical workers (or one out of five) were employed in research projects and technology, including 181,200 with higher education and 265,200 with secondary education. In machine building and metal working, where the technical training of production has particular importance, 43.4 per cent of the specialists were engaged in planning, designing, and technological research, while in energy machine building, there were 53.3 per cent.

The perfecting of the techniques of drafting projects and studies in those fields, and the broad scope of scientific research and experimentation, have made it possible to use the work of technicians on a large scale.

From 1941 to 1963, the number of specialists with secondary education engaged in scientific research, on studies, and in designing organizational work increased 11.5 times, while the number of specialists with higher education increased 7.5 times. The percentage of technicians among all the specialists working in the above-mentioned fields increased from 25 to 34 per cent.

In scientific, research and project-designing organizations, specialists with secondary education are used as technicians and head technician-designers, technician-technologists, research assistants, laboratory assistants, head laboratory assistants, technician-planners, and other similar occupations.

The work of specialists with secondary education also finds extensive use in the executive branch and laboratories of factories.

The problem that remains is to define the role of technicians and of other specialists with secondary education in each branch of the national economy, and to employ them with the greatest effectiveness.

CONCLUSION

In spite of the considerable growth in the number of technician graduates, the increase in preparing specialists with secondary specialized education is still insufficient, compared with that of specialists with higher education. Therefore, it is proposed to accelerate the development of secondary specialized education, so that by 1970 there should be three or four specialists with secondary education in industry, construction, transport, communications and agriculture, for every specialist with higher education. The increase in the number of pupils will be effected by expanding existing technicums, setting up branches and departments in industrial enterprises, on building sites, large state farms, scientific research institutes and other organizations as well as by creating new secondary specialized establishments, especially in areas where there is intensive development of industry and agriculture.

Chapter 4 Higher education

Introduction

ROLE AND SIGNIFICANCE OF HIGHER EDUCATION
BREAKDOWN BY NATIONALITY OF NUMBER OF STUDENTS AND GRADUATES WITH HIGHER EDUCATION

Higher education occupies one of the most important places in the Soviet system of public education. This is natural since higher education completes the process of training new groups of highly qualified intelligentsia - scientific and technical personnel and other specialists for work in all the branches of national economy, culture and science. The progress of science, engineering, culture and society depends on the quantity and quality of these specialists. In modern conditions, little can be achieved in society without science and technology which in turn require specialists and scientists. Not only are professional scientists needed but also those who participate in the industrial process and specialists with high qualifications. Accordingly, the role of specialized, and more particularly of higher education is heightened beyond all previous levels in our day and age. Higher education is one of the most important elements in the development of science and technology and in the utilization of their achievements to speed economic, cultural and social progress. In our country, therefore, higher education is organized to make the fullest use of the individual's talents at all levels of development and to ensure the maximum use of his potentialities in all spheres of life, i.e., on a profound scientific basis, drawing on all the achievements of national and world science, technology and culture. The increasing development of our Soviet society, along scientific lines, demands all possible improvements in the academic standards of both general and higher education. This task faces our specialized higher schools. It is one that is within their capacity; because we have a solid foundation provided by the wide development of universal public education guaranteed by our socialist structure.

It is well known that, in the course of its cultural revolution, the Soviet Union has produced large numbers of specialists from among its own national intelligentsia, who have played a prominent part in the scientific and technical progress of our country and in the world. The core of this intelligentsia consists of specialists who have graduated from Soviet higher and secondary specialized educational establishments. A few figures are worth citing. Whereas in tsarist Russia, according to the 1897 census, there were 700,000 intellectuals, in 1926 at the start of socialist industrialization, they already numbered 2.5 million. By the beginning of 1965, 72.4 million people or 32 per cent of the total population of the Soviet Union had received secondary and higher education. Half the active population of the country had had secondary and higher education, including about 44 per cent who were workers, 26 per cent collective farm workers and 92 per cent specialists and employees.

Before the revolution, there were some 10,000 scientific workers but by the beginning of 1965 there were 612,000 in the USSR. The rate of growth in the numbers of scientific workers over a series of years is illustrated by table 5.

Table 5. Rate of growth in the numbers of scientific workers from 1914 to 1 January 1965 (in thousands)

	Number of scientific workers having higher education	Total number of scientific workers
1914	6.0	10.2
1940	61.4	98.3
1953	105.4	191.9
1962	179.5	524.5
1963	196.8	566.0
1 January 1965	206.3	612.0

This swift growth reflects the high rate of development of the USSR national economy in all its branches, as well as the steady rise of the role of intellectual work due to the increased electrification, mechanization and automation of industrial processes and the increase in the creative activity of the Soviet people. At present, the Soviet Union has 754 higher educational establishments, with a total enrolment of 3.6 million. Soviet universities are capable of training specialists in any branch of learning. A particularly marked development has occurred in advanced humanistic studies, higher technical education (engineering), as well as graduate agricultural and medical education.

Prior to the revolution, only twenty-one cities in our country possessed institutions of higher education. There are at present 279 USSR cities with permanent universities, or more than 500 if we include cities with branches and consultative centres in VUZ[1]. Before the revolution, institutions of higher learning were established without reference to the economic and cultural needs of the peripheral areas and were concentrated essentially in the centre of the country. Today the network of these institutions is being developed with due regard to the requirements of all nationalities which need highly qualified specialists for their economic and cultural progress.

Whereas before 1917, for example, there were hardly any specialists among the Uzbeks, Kasakhs, Tadzhiks, Turkmens, and other nationalities, every fourth inhabitant of these republics now has had a higher or secondary education. Not a single Union republic lacks its own national university and other higher educational establishments training highly qualified specialists in different professions: teachers, doctors, engineers, lawyers, agricultural engineers or agricultural mechanization specialists. Before the revolution, there was no higher educational establishment in the territory of the Byelorussian, Azerbaidjan, Armenian, Uzbek, Tadzhik or Turkmen republics. At present, several thousand inhabitants of these republics are studying in their own universities.

Soviet schools for higher education developed as multinational institutions. The national origin of students in VUZy and the nationality of specialists with higher education employed in the national economy are shown in table 6 and table 7.

These figures bear witness to the fact that all nationalities of the USSR benefit from higher education with an important place held by women.

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[1] 'Vyssie učebnye zavedenija' (higher educational establishments).

Table 6. Composition of students, by nationality, in schools of higher education in the year 1963/64 (in thousand)

Nationality	Number of students	Nationality	Number of students	Nationality	Number of students	Nationality	Number of students
Russians	1 987.9	Tadzhiks	14.5	Komis	3.7	Abkhazians	1.4
Ukrainians	476.4	Armenians	49.5	Maris	3 5	Kalmyks	1.5
Byelorussians	97.9	Turkmens	12.7	Mordovians	6.9	Jews	82.6
Uzbeks	79.3	Estonians	16.6	Ossetians	9.2	Tuvas	1.5
Kazakhs	58.0	Bashkirs	9.8	Tatars	58.5	Adygeis	1.7
Georgians	62.8	Buryats	7.1	Udmurts	4.9	Altaians	0.5
Azerbaijanis	43.2	Nationalities of Daghestan	11.4	Chechenis	2.8	Karachais	1.7
Lithuanians	36.2	Kabardins	3.0	Ingutsi	1.6	Khakass	0.7
Moldavians	18.3	Balkarians	0.9	Chuvash	13.2	Cherkessians	0.5
Latvians	20.8	Karelians	1.3	Yakuts	4.4		
Kirghiz	13.3			Karakalpaks	3.1	Total	3 260.6

Table 7. Composition of specialists having higher education, by nationality, and employed in the national economy as of 15 November 1964 (in thousands) ([a])

Nationality	Specialists		Nationality	Specialists		Nationality	Specialists	
	Total	Women		Total	Women		Total	Women
Russians	2 679.4	1 542.8	Tadzhiks	15.5	2.7	Karelians	1.6	0.9
Ukrainians	667.2	331.3	Turkmens	14.4	2.3	Karachais	1.6	0.6
Jews	322.7	156.3	Kirghiz	13.1	3.7	Abkhazians	1.4	0.6
Byelorussians	126.2	62.1	Ossetians	12.4	5.4	Adygeis	1.4	0.5
Georgians	106.9	44.4	Nationalities of Daghestans	10.3	2.7	Chechenis	1.2	0.3
Armenians	91.4	39.2	Bashkirs	9.6	4.5	Kalmyks	1.0	0.5
Uzbeks	70.6	18.7	Mordovians	7.6	3.4	Tuvas	0.9	0.4
Tatars	67.2	37.5	Buryats	6.3	2.8	Khakass	0.9	0.5
Azerbaijanis	61.5	18.1	Komis	5.5	3.3	Altarians	0.9	0.5
Kazakhs	49.8	15.9	Udmurts	5.4	2.8	Cherkessians	0.7	0.3
Lithuanians	40.1	20.0	Yakuts	4 6	1.8	Balkarians	0.7	0.2
Latvians	31.8	17.7	Maris	3.3	1.3	Ingutsi	0.6	0.2
Estonians	24.0	12.6	Kabardins	2.9	1.0			
Moldavians	16.7	7.1	Karakalpaks	2.8	0.4	Total	4 547.6	2 394.3
Chuvash	16.3	6.5						

a. In order of decreasing numbers of specialists

While the number of trained specialists increases and their training is constantly being improved, Soviet schools must take into account the demands of rapidly developing production. So, there has been a rise recently in the training of specialists in the fields of the mechanization and automation of industrial processes, organic chemistry and chemical technology, radio-physics and electronics, computer techniques, nuclear processes and certain other special fields of the new technology. Training began on a large scale, combining such seemingly widely separated specialities as philology and mathematics. When a language specialist studies mathematics, it is in connexion with translation machines; if he knows economics and computer techniques he can use computers for economic calculations, etc.

Section I STRUCTURE OF HIGHER EDUCATIONAL INSTITUTIONS

Most of the higher educational establishments in the USSR are state bodies and are maintained out of the state budget. A small exception is the higher educational institutions belonging to co-operative and private organizations (Co-operative Institute, Higher Trade Union School, Patrice Lumumba People's Friendship University, etc.). Three types of teaching are given: day-time training where the students study only; evening tuition where the students work and study in the evening in institutes and universities, and correspondence courses where study material and exercises are sent to the student at his place of residence and he reports to the institute or university at least twice every school year in person to take the examinations. Usually these three types of instruction are to be found simultaneously in one and the same higher educational establishment. The diplomas issued to students finishing at these educational establishments carry equal weight, regardless of the establishment or the particular form of education.

The main classifications of higher educational institutions are the universities, and the polytechnical and specialized institutes. Because of their instructional content as well as for the sake of convenience in the text, the institutes for humanistic studies are grouped with the universities.

A. UNIVERSITIES AND INSTITUTES FOR HUMANISTIC STUDIES

a. Universities

Historically, these large scientific centres play the leading role among higher educational establishments.

The university embraces all branches of humanistic studies and the exact and natural sciences (letters, journalism, history, philosophy, economics, law, geography, geology, mathematics, physics, biology, chemistry, etc.). Here, it may be pointed out that humanistic studies are extremely popular with young people. The greatest competition is for entry to studies of literature, law, history, philosophy, and journalism.

The Soviet Union recognized that education in the humanities is one of the ways to encourage the all-round development of human personality in society, and to rear young people in the spirit of peace, mutual understanding, and humanism.

This explains the wide development in the USSR of a network of higher educational institutions which train specialists in different branches of the humanities and the large numbers of young people studying these subjects. It also explains why in 1958, the Supreme Soviet of the USSR adopted a law which provides that all who desire it, and who have already received higher specialized education, shall be given wide access to education in the humanities, in art and in music - all to be achieved without the student leaving his industrial occupation.

The universities in our country, as the generally acknowledged guardians of scientific values, are the oldest of our higher educational establishments and they played a key cultural and educational role in pre-revolutionary Russia. The organization of the first university in Russia is linked with the same of the great Russian scholar, Mikhail Vasilyevich Lomonosov, who strove to democratize university education. The pre-revolutionary universities served as centres for the development of progressive scientific thought.

After the October Revolution the universities enjoyed Lenin's support. He valued them as a successful synthesis of scientific and pedagogical work and suggested developing and perfecting them in the Soviet State. Today, the universities occupy a prominent place in our country and provide an example for many higher educational institutions in the organization of teaching and research.

They train workers for scientific research institutions and laboratories of enterprises and also teachers for secondary general educational and specialized schools in native languages and literature, history, mathematics, astronomy, physics, chemistry, and other subjects.

In the faculties of history and letters, for example, students learn the language and literature of the peoples of the republic concerned, Russian history, as well as the history of their republic, philosophy, psychology, political economy, journalism, librarianship and bibliography, and many other subjects.

A number of universities have schools of foreign languages and literature, particularly for English, French and German.

A special feature of university education in the USSR is the wide general educational training that is given. When a student leaves the university, he must be a trained specialist who not only knows his own sphere of knowledge but also has a good command of the basic branches of science, as well as a number of allied subjects. Teaching in universities, as in other similar institutes (VUZy), is based on the link between study and scientific work. The period of instruction is four and a half to five years. The final year is devoted mainly to writing a thesis for a degree which involves a scientific research project. Instruction in a university terminates after the student defends his thesis before a meeting of professors and passes state examinations.

The major scientific teams capable of conducting broad research are, as a rule, concentrated in the universities. It is they who assure the high level of scientific training given.

There are now forty universities in the USSR (in tsarist Russia there were thirteen), with some 260,000 students. The largest is the Moscow State University. It has 27,000 students and more than 2,500 post-graduates, who are taught by 4,000 highly qualified professors and tutors.

The universities also occupy an important place in the training and re-training of teachers. Several universities (in Moscow, Leningrad, Urals, Central Asian and Kazan) have in recent years acted as bases for organizing and implementing teacher re-training measures. There are also institutes for the re-training of teachers in the social sciences, letters, mathematics and physics.

Scientific work at the universities has important theoretical and applied significance. We take the view that technical progress in industry is, and must be the result of successes won in the natural and exact sciences such as physics, chemistry, biology, geology, mathematics, etc. Consequently, the outstanding scientists and teachers in these spheres must be concentrated in the universities.

b. Institutes for humanistic studies

Humanistic education in the USSR is also given extensively in pedagogical, economic, law, and historical archives institutes, library schools, and in the numerous types of art institutes such as academies of music, dramatic art, and plastic arts.

Economists are trained in twenty-four economic institutes and also in nineteen universities, fifty-six engineering VUZy, and thirty-eight agricultural VUZy.

Seventy thousand future jurists are being trained in law institutes and in the law faculties of universities.

Courses in forty-eight art VUZy are taken by 50,000 students. Among these VUZy, there are twenty-two music academies, twelve dramatic art institutes and institutes providing courses in both dramatic art and plastic arts, several fine arts academies, plastic arts institutes, decorative and applied art institutes, industrial art schools, an institute of literature, and other higher educational establishments.

There are 200 teacher-training institutes in our country in which more than 700,000 students are taught, almost a half by correspondence or in evening schools. In teacher-training colleges, instruction is given to teachers of grades 5-10 of secondary general educational labour polytechnical schools in all subjects, including those in labour, drawing, mechanical drawing, physical education, singing, etc.

It may be wondered how the training of teachers in teacher-training colleges (VUZy) differs from university training.

As a rule, the university trains teachers in a single subject (e.g., mathematics, physics, chemistry, the native language and literature and other subjects) for large schools.

In teacher-training colleges, more often than not, the future teacher is given training in two subjects: one of them a basic subject, such as history, and a second supplementary one at the student's option, e.g., singing, physical culture, etc. There can also be other combinations, e.g., a native and a foreign language, mathematics and mechanical drawing, etc. Such a teacher can work in a school with fewer staff where the teaching load of the teacher is comparatively light. This enables us to establish comparatively small schools in thinly populated localities.

Consequently, the teacher who has finished his studies at a university has a more fundamental scientific education than if he had attended a teacher-training college but, as against this, the latter provides better training in pedagogy and teaching methods. At present, steps are being taken to strengthen considerably the teacher training given in universities and, particularly, teaching practice in schools.

History and literature departments are also widely represented in teacher-training colleges as well as faculties for natural science and mathematics. A number of teacher-training colleges have special departments which train teachers to deal with blind, deaf or other handicapped children.

A number of teacher-training colleges are launching programmes to prepare teachers with higher education for the primary grades in schools of general education. This measure has a great general cultural significance, since the 'mass' primary school, which lays the foundations of knowledge and instils a love for learning, will be served by a highly qualified teacher who commands a large store of varied modern scientific knowledge and has had good practical teaching training. It is most important to give children proper guidance in the first years of their school life. Qualified teachers for this purpose will facilitate the implementation of universal compulsory education in the country.

Teacher-training colleges are fairly evenly distributed throughout the country and in all the republics. Taken together with the universities, it is thus possible not only to provide teachers for all secondary schools but also to train the necessary number of teachers for national schools where the lessons are given in a non-Russian language.

B. HIGHER TECHNICAL EDUCATION: POLYTECHNICAL AND SPECIALIZED INSTITUTES

More than 200 specialized subjects or trades are taught in different kinds of technical institutes in the Soviet Union. They can be divided into two groups: polytechnical and trade (specialized).

Among the technical institutes the polytechnical colleges occupy a special place. Usually they are educational establishments with several faculties and a considerable number of different specialized trades.

For example, in one of the largest establishments of this type, the Leningrad Polytechnical Institute, there are nine faculties: physics and metallurgy, mechanical engineering and machine construction, power machinery engineering, electrical engineering, engineering physics, hydraulic engineering, radio engineering, etc. Each faculty covers the specialized trades related to it. The school of radio engineering provides courses in radio-physics, industrial electronics, dielectrics and semi-conductors; the metallurgical faculty in metallurgy of ferrous and non-ferrous metals, foundry work, pressure machining of metals, etc.

The institute gives instruction in a total of forty-eight special trades, to about 14,000 students. It has 890 professors and teachers, and more than 200 laboratories equipped with modern apparatus, thus enabling it to carry out on a wide scale laboratory and research work. Many polytechnical schools are organized on similar lines, e.g., the Urals Polytechnical Institute (thirteen faculties, thirty-six specialized trades), the Kharkov Polytechnical Institute (fifteen faculties, thirty-eight specialized trades), the Kaunas Polytechnical Institute (seven faculties, eighteen specialized trades).

The trade college usually trains specialists for specific branches of industry. They include: metallurgy, mining, construction, chemical technology and transport. The number of specialized trades and faculties in these colleges is usually less than in the polytechnical institutes. For example, the Dnepropetrovsk Institute of Mining trains engineers for the mining industry and has the following faculties: geological prospecting, mining, mine engineering, and pit construction. Some 6,500 students learn sixteen specialized grades. The Novosibirsk Building Institute has four faculties and provides training for engineers in six specialized building trades.

As already pointed out, the division of technical institutes into polytechnical schools and trade colleges is nominal. There are a number of technical institutes which occupy an intermediate position, e.g., the Moscow Power Institute. Though it is theoretically a higher educational trade institution it has in fact a considerable number of faculties (ten faculties and twenty-six specialized trades). The Moscow Higher Technical Institute, though normally a trades college, also has a structure closely resembling a polytechnical school.

The number of higher technical educational establishments, their type and the special features of their structure reflect the standards, requirements and prospects for the industrial development of the national economy. At present, there are 222 higher technical educational establishments, whereas in 1914 there were sixteen. Their location has changed too. In pre-revolutionary Russia nine cities had technical institutes but now they exist in eighty. They are not only in large centres but also in new industrial areas much nearer to industry.

C. HIGHER EDUCATIONAL SCHOOLS OF AGRICULTURE

The organization of a large-scale, highly mechanized agricultural industry in the USSR and its operation on scientific lines has created an enormous demand for specialists. In consequence, the network of higher educational schools of agriculture has been considerably enlarged. Whereas previously there were only fifteen such schools with 5,000 students, there are now ninety-six agricultural institutes in the Soviet Union with a total enrolment of more than 350,000 students. Training is offered in three fields: agricultural science, stock-breeding and veterinary science, and mechanization of agriculture.

Since agricultural colleges are more or less evenly distributed throughout the country, it has proved possible to organize teaching in them in such a way that curricula and programmes deal with the problems that most closely concern the area, taking into account its special features inasmuch as this is where the specialists who are being trained will work later on.

Experimental teaching in agricultural colleges has been greatly expanded and strengthened. More than seventy state farms have been turned over to these colleges. For instance, the state pedigree farm, 'Karavaevo' has been attached to the Kostroma Institute of Agriculture; it has an area of 11,429 hectares, about 2,000 head of cattle, more than 1,200 pigs and about 10,000 head of poultry. Along with theoretical study of agricultural production, students also get practical experience. This gives excellent results.

In the USSR the agricultural institutes are becoming more and more scientific centres and are giving effective help to the collective and state farms.

D. HIGHER EDUCATIONAL SCHOOLS OF MEDICINE

The wide development of higher medical education reflects the Soviet government's concern for the individual. To give an idea of the success achieved in the sphere, it is enough to say that in 1914 Russia had but eight higher medical educational establishments, situated solely in central Russia and training 1,000 to 1,500 doctors annually. From the early days of the Soviet régime the country's medical institutes were assigned the task of providing the many million persons in the Soviet republics with a sufficient number of highly qualified medical practitioners. As a result, by 1922 the number of medical colleges had risen to twenty-six. Today there are eighty with a total enrolment of more than 200,000 students. Simultaneously, there has been a radical change also in the location of medical institutes. In the remote border areas where, formerly, there was no trace of an educational institution or of a doctor, medical institutes are now training a highly qualified corps of doctors.

Doctors are trained in the following specialized subjects: general medicine, pediatrics, public health, stomatology and pharmaceutics. The course of study lasts six years.

The need for periodic refresher courses for practising doctors - accentuated by the constant advances in medical science - has given rise to a system of institutes and courses, most of them associated with medical colleges. At the present time, medical institutes are producing about 25,000 doctors per year. As a result, the population is amply provided with highly qualified medical assistance free of charge. This has made it possible to achieve a sharp reduction in mortality, to raise the birth-rate, prolong the life-span and, thus speed population growth, as statistics confirm.

There has been a great expansion in the USSR of higher education in physical culture and athletics. Training of doctors and teachers of physical culture is carried out in sixteen institutes with about 20,000 students.

E. PART-TIME HIGHER EDUCATION

Evening school and correspondence courses

One of the democratic principles of Soviet education is the wide development of evening schools and correspondence courses. In any particular community there will be many who, for one reason or another, are unable to obtain higher education in the ordinary way. They are, as a rule, older people who have families and do not want to leave their jobs. It would be unjust not to feel concern about enabling these capable workers to obtain higher education.

Therefore evening classes and correspondence courses constitute an important step forward, since they enable people engaged in socially useful work to acquire, without interrupting their professional activities, new scientific knowledge as well as new professional skills and qualifications.

Evening school and correspondence-course teaching has expanded considerably in the USSR. An extensive system of higher education through these means of instruction has been set up by universities and other institutions of higher learning. There are twenty-nine independent correspondence schools and evening institutes and more than 1,000 correspondence courses and evening classes run by full-time institutions of higher learning. The total enrolment is more than 2 million.

Large firms and construction enterprises have also offered facilities for evening schools and correspondence courses.

Latterly, general technical faculties have been organized in a number of colleges (VUZy), where students receive general scientific and general engineering training in the first three years regardless of the specialized trade chosen by the student. By organizing their studies in this fashion it will be possible to bring correspondence course instruction closer to the student's place of employment and residence and so create better conditions for acquiring knowledge.

Since 1958, educational establishments of a new type have been organized in the USSR: workshops-VTUZ[1] and the sovkhozes-VUZ, as well as people's universities and study groups. Valuable experience has been gained through the work done by the workshops-VTUZ in such industrial giants as the Likhachev Motorcar Works in Moscow, the Leningrad Metal Works, and the Rostov Agricultural Machinery Works. In the workshops-VTUZ, the teaching process is organized on the principle of rotation, i.e., one week of instruction in the institution, followed by one week of employment in the enterprise, along with independent study or a small number of evening classes held at the institution. During the first three years the students acquire specialized skills, and beginning with the fourth year of study, they work as technologists or foremen while gaining theoretical knowledge and acquiring organizational skills.

In a workshop-VTUZ, engineers are trained for the factory or enterprise in which the institution has been organized and also for associated enterprises. Accordingly, students are in contact from the beginning with the technological processes and operations they will perform and develop after they complete their studies.

The expansion of the network of the sovkhozes-VUZ is no less important. Many higher educational institutes of agriculture have been moved out of central cities on to large kolkhozes or sovkhozes, as well as to test-model and experimental farms. In this way a new type of higher educational school of agriculture is created which will be literally and figuratively linked with its field of activity.

In the near future the system of correspondence course and evening class instruction will be further improved in the USSR. The main point on which attention is now being centred is the upgrading of training, especially in the field of theory. Once the trainees are well acquainted with practical work, they will in the later courses be instructed during breaks in employment so as to be provided with a deeper knowledge of the methods adopted in scientific research and planning-and-design work.

Audio-visual aids such as the cinema, radio and television are more and more widely employed in the evening classes and especially in the correspondence courses. The infrastructure of the evening and correspondence institutions and departments of higher education is being developed and their teaching staff is being strengthened. Admission qualifications tend to be tightened in order to raise the educational level of prospective entrants who wish to continue their education without interrupting their professional activity. Steps are being taken to provide all pupils studying without leaving their jobs with the most up-to-date textbooks, manuals and lectures.

Scholastic publishing has been centralized in the USSR. This makes it possible to issue every year a large quantity of new textbooks and study manuals. In 1955, 328 textbooks and manuals were published; in 1963 more than 800. There was a long-range plan for the publication of textbooks and manuals for higher educational institutions in the years 1962-65 and during this period more than 4,000 titles were to be published.

Instruction given to students by correspondence or in evening classes is regarded by Soviet enterprises and institutions not only as the personal concern of the student but also as a matter of social importance. Students are thus accorded, at their places of employment, the necessary conditions for systematic, independent study. For example, they are not sent out on missions or given overtime work to do, etc. Wide opportunities to gain higher education by correspondence or evening school instruction are also ensured by the government which grants them paid leave of absence when they are doing laboratory work or when they are preparing or taking their annual examinations. When the same students transfer to day-time study courses they are awarded state scholarships. The libraries in enterprises and institutions which have correspondence course or evening class students obtain the necessary textbooks and study manuals for them to use free of charge.

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[1] 'Vyssie tehničeskie učebnye zavedenija' (higher technical educational institution).

Section II ADMINISTRATION OF HIGHER EDUCATIONAL INSTITUTIONS

A. SYSTEM OF MANAGEMENT

The administration and finance of the majority of schools of higher learning are the responsibility of the Union republics. Accordingly, each republic has a ministry or committee to administer certain higher educational institutes. The following institutes are under the authority of the republics: universities; polytechnical institutes specializing in industry, power, electro-technology, radio-technology, physico-technology; machine building, instrument making, ship building; aviation, polygraphy; machine-tool making, mechanical skills, geology, peat cutting, chemical technology, food industries, fish industries, textiles; engineering building, geodesy, economics, law, architecture, and lastly; the workshops-VTUZ.

Some of the specialized institutes are subordinated to government departments. For example, the transport VUZy and the telecommunications VUZy come under the corresponding ministries, agricultural and forest-technology VUZy under the ministry of agriculture, medical VUZy under the ministry of public health, pedagogical VUZy under the ministry of education of the republics (except in the Byelorussian SSR where pedagogical VUZy are under the jurisdiction of the Ministry of Higher, Secondary Specialized and Professional Education of the republic), art VUZy are under the ministry of culture, and trade VUZy under the ministry of trade.

Republics and central services guide those VUZy under their jurisdiction on all questions concerning specialist training (finances, admission of new students, co-ordination of the teaching process and scientific research, the finding of positions for young specialists, the preparation of scientific, pedagogical personnel in graduate schools, etc.). The independence of the republics in resolving these questions ensures the development of higher educational schools as national schools answering the interests of the peoples of the republics.

Over-all supervision by the Ministry of Higher and Secondary Specialized Education of the USSR maintains the unity of the pedagogical process, scientific methodological and educational work, regardless of the administrative subordination of the VUZy. The main tasks that the ministry carries out are the elaboration and approval of teaching plans, the drafting of publication programmes for textbooks and other teaching methodological literature, the preparation and co-ordination of scientific research, the formulation together with the USSR Gosplan of current and long-range programmes for higher educational development and relations with other organizations.

Administrative control of VUZy has varied and improved with the changes in the national economy in accordance with the general state and republic interests.

B. INTERNAL ADMINISTRATION

Within the institutes or colleges administration is shared by the director with a group of advisers. Every higher educational institution is headed by a rector who has several deputies (vice-rectors) for pedagogical, scientific and administrative questions. The rector is also chairman of a council whose members are the pedagogical and scientific vice-rectors, the deans of the faculties, the professors in charge of departments and certain lecturers. The social organizations of the VUZy are represented by one of their leading members. Representatives of enterprises, institutions and organizations related to the field of the VUZ also belong.

The councils are vested with broad powers in different spheres of VUZ activities. They discuss questions of teaching and methodology, draw together the teaching experience of departments, faculties and the VUZ as a whole, award the academic title of assistant to instructors and consider candidates for the academic titles of 'dotsent' and professor. The councils of the larger higher educational establishments have the right to accept or refuse candidates for the academic degrees of 'kandidat' of science and doctor of science. They also confer the degree of 'kandidat' of science, and recommend the award of doctorates of science.

The rector approves plans for scientific research, including general scientific theoretical problems and current technical problems in industry and other branches of the economy, and the practical application of the results of research.

Higher educational institutions publish the scientific works of professors and instructors on the staff, courses of lectures, manuals for practical and laboratory studies, collections of exercises, manuals on teaching methods, papers, popularization pamphlets, etc.

The faculty prepares specialists in one or more related fields. It is headed by a dean, selected by competition from a number of professors presenting the leading disciplines. The dean has direct charge of the teaching and scientific work, oversees its logical organization and directs the practical production work of students.

In the larger higher educational establishments, there are faculty councils under the chairmanship of the deans which have more or less the same functions as the VUZ councils. The larger faculty councils have the right to examine students for degrees.

The primary educational and scientific cell of each VUZ is the department ('kafedra'), which deals with teaching methods and scientific research work in one or more closely connected subjects.

The department is headed by the supervisory professor. He has charge of the laboratories and classrooms, gives lectures on basic courses, directs the work of other professors, assistant professors and lecturers and verifies the quality of the lectures. He directs the work of students, the preparation of 'aspiranty', and the improvement of the qualifications of professors and teachers in the department.

The staff of a department usually comprises professors, and if several courses are taught, senior lecturers, lecturers, and assistants. There is usually also a staff of teacher-auxiliaries such as laboratory assistants.

The department head and professors are chosen by competition, usually from persons holding the title of professor or the academic degree of doctor of science. Senior lecturers are chosen by competition from persons holding the academic title of 'dotsent' or the degree of 'kandidat' of science. The appointment of teaching staff is made for a five-year period by the academic councils of faculties or the VUZ.

The department follows a plan approved by the rector for the entire academic year which covers instruction, scientific research and methods. It also includes the preparation of new textbooks and teaching manuals, direction of the activities of students' scientific clubs and societies, and the preparation of 'aspiranty'.

An increasingly active part in the work of departments, particularly in connexion with scientific and technical problems, is also taken by highly placed officials in industry and agriculture - chief engineers and chief technologists in works, factories, mines, directors of laboratories, agricultural engineers on sovkhozes, kolkhozes, agricultural experimental stations, etc. Furthermore, reports are read at departmental meetings and occasional lectures are also given in students' lecture halls by 'worker-innovators' and leading workers in agriculture who describe their own production experience.

Professors and instructors, in their turn, assist enterprises by taking part in their scientific research. They also join in working out, and sometimes even carry out the entire direction, of new technological processes, new ways of building machinery appliances, and so on.

Industrial and economic VUZy actively share in the work of solving highly important problems of a scientific character, improving production on the basis of the latest advances in science and technology, finding ways to lower industrial production and construction costs, and of developing as a single whole the wealth of the economic region in whose territory they are located. As a result, a vital, scientific and technical connexion is steadily maintained between institute departments and enterprises, particularly in post-war years as an association between workers in science and industry.

Every higher educational institution has a number of social organizations which bring together students, professors, lecturers and fellow-workers of VUZ.

Section III ORGANIZATION OF THE TEACHING PROCESS

A. ADMISSION RULES AND GENERAL AID TO STUDENTS

Before describing the system of teaching in Soviet higher educational schools, a brief reference should be made to admissions policies and to the material conditions affecting students. In the USSR every facility has been afforded to open higher educational establishments to every qualified young person, irrespective of his social origin, sex, nationality or religious belief.

Higher educational schools accept for admission all citizens up to 35 years of age who have passed a competitive entrance examination.

Admission to all VUZy is regulated by rules approved on a yearly basis by the Ministry of

Higher and Secondary Specialized Education of the USSR.[1] Entrance examinations are conducted by examination boards consisting of professors and qualified teachers and follow the uniform curricula of secondary schools. The competitive entrance examinations enable an impartial check of each entrant's knowledge so as to select the young persons who are best prepared and most capable.

Moreover, in addition to the marks obtained in the entrance examinations for admission to higher educational schools, account is also taken of the marks obtained while studying in the secondary educational school. This system of selecting future specialists and scientists provides wide opportunities for developing the creative abilities of young persons. In this connexion great advantages are derived from what is becoming a more and more frequent practice in our country, the olympiads, in various scientific subjects, which help to bring to light the brightest young people who show particular interest in a subject before entering a higher educational institution.

The proportion of students with industrial experience to those without it follows the proportion of applications. If, for example, the plan foresees admission of 1,000 new students to a university or institute and there are 4,000 applications, among them, let us say, 3,000 from students who finished secondary school in the past two years, and 1,000 from production workers with two years of experience or military service, the rector follows the same proportion. He will admit 750 students and 250 industrial workers.

In Soviet higher education, the competitive examinations for students and for workers are separate. Each group must meet the same requirements. Nevertheless, this form of selection is the most equitable one: it provides equal conditions for students and workers and yet gives the workers a definite advantage in that they compete only among themselves and not with the students who have fresher knowledge.

Workers who are sent directly from enterprises compete with other workers. Although they have preference for admission, equal opportunities are provided, but in modified form. Preparation for the entrance examinations is offered to all candidates, but production workers get this training in their enterprises, institutions, sovkhozes and kolkhozes.

Boys and girls who do not pass the examinations and thus are not admitted to the institutions of higher learning take positions in industry, agriculture or administration. As time goes on, many of them enter evening classes or join the correspondence schools of higher institutes and obtain an education without leaving their jobs. Others, with the benefit of their experience in life and at work, undergo serious preparation for the entrance examinations and, if they pass, continue their studies by day in institutions of higher education.

In the USSR, any young person who is not admitted to a VUZ in a given year, can in the following year take the entrance examinations. In fact, there are cases of persons taking examinations two and three years in a row before succeeding. While the age limit is 35 in a day-time VUZy, there is no limit in evening and correspondence VUZy.

Priority for the correspondence and evening courses is given to those who are already working in their specialized fields, especially in technical and agricultural specializations. In all agricultural and biological institutions of learning, preference is given to people who have worked in those fields.

The rules of admission foresee advantages for those finishing secondary school with gold or silver medals or with excellent marks. If the student obtains the mark '5' in one of the principal subjects, he does not have to take the rest of the examinations but participates in a competition with those who had the mark '5' in all other subjects. If he receives the mark 'good' or 'satisfactory', in the principal subject, he takes the examination like everyone else. This system makes it possible to offer advantages to some without lowering standards. The number of entrance examinations depends on the specialization chosen and the VUZ. The number of principal subjects for entrance examinations in the majority of special fields does not exceed three.

It is important to note that representatives of local soviets of deputies of industrial and agricultural institutions, representatives of trade unions and komsomols participate actively and directly in the recruitment of students for higher educational schools. Thus recruiting for educational institutions is above all, a social task. Industrial institutions, construction works, kolkhozes and sovkhozes are thus permitted to prepare their workers for study in VUZy, and to offer them scholarships.

The introduction in the rules of admission some years ago of new criteria which provided for the admission to higher educational institutions, not only of those young people with extensive scientific knowledge, but also those with some practical training is the consequence of the educational philosophy which unites higher educational studies with science and industry, creates closer ties between higher educational schools and life and allows for more active participation by the Soviet people.

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[1] The rules of admission are based on broad democratic principles. The Ministry of Higher and Secondary Specialized Education of the USSR notes the experience of previous years and draws up a plan for new rules for the following academic year. This is sent to the VUZy, to large enterprises, and to Union and republic ministries and departments, who then communicate their observations and proposals. A ministry conference examines all the comments and then approves the rules of admission.

The preference for people having worked for a period of time shows a positive influence toward the elimination of social differences. These advantages, as well as the participation of industrial and construction institutions, kolkhozes and sovkhozes in the admission process, facilitate higher education for young workers and peasants.

There is no discrimination in the USSR regarding university admission in respect to any class. Foreigners residing in the Soviet Union can enter any VUZ on the same basis as Soviet citizens. Soviet schools of higher education accept young people representing all layers of the population - the working class, kolkhoz peasants, the intelligentsia, co-operative and independent peasants. For example, in one of the larger universities of the USSR, students from families of workers and peasants make up 56 per cent of the enrolment. In specialized applied science VUZy, the percentage of such students reaches 60-65 per cent and in agricultural VUZy even higher. The age of students in full-time schools varies between 17-18 and 22-24 years. A comparatively small percentage of students are 25-26 years of age; the main mass of students terminate higher education at the age of 22-24 years.

Most of the students (75 to 80 per cent) receive state scholarships which provide them with a minimum living wage. In addition, rectors of universities and institutes have at their disposal special funds provided by the State which they can, at their discretion, use to give assistance to individual students. Higher educational institutes have special student hostels. The charge for these is low. The extra funds needed to enable the hostels to operate normally are provided by the State. During the summer and winter vacations, students are given travel warrants to sanatoria and tourist camps.

Students are given generous help by trade unions and public health administrations. During vacations no less than 10 per cent of all places in rest homes and sanatoria belonging to the trade unions and the public health ministries of republics are put at the disposal of students.

In these circumstances any capable person in the USSR, even if he does not receive any material help from his relatives, can study at state expense.

In the institutes of the national republics, students are taught in their native languages. If there is a substantial number of representatives of other nationalities living in the republic, special groups are organized for them. In this way effect is given to the constitutional right to education.

B. CURRICULUM

Different methods of teaching are practised in Soviet higher educational schools. Their governing principle is the desire to develop to the fullest extent the bent and abilities of students and to combine theory with practice.

Without exception, attention is paid in all branches of higher education to the practical aspects of training specialists, with due regard for scientific and theoretical principles and allowance for the special feature of each branch.

Since 1965, practical training[1] in higher educational institutions has been somewhat altered. From 1958, when it started, practical training had failed to produce practical results. This training in technicums and VUZy (except for those linked with seasonal work such as agriculture), has been transferred from the first year and now properly begins after the third year courses. In this way, in the student's most crucial period of formation, he studies theoretical sciences and after a solid preparation of three years he furthers his preparation by combining it with practical work.

The curricula and programmes of institutes are substantially reviewed from time to time. This makes it possible to bring to the student's notice not only scientific knowledge that has stood the test of time but also everything that is basically important and new emerging from both scientific research and industrial experience.

The curriculum sets forth the order in which subjects are to be studied, their inter-connexion and the study procedure to be followed. It contains forty to fifty different subjects and consists of 'cycles': social and economic, general scientific and specialized. In higher technical education institutes a general engineering 'cycle' may be included, as it occupies a very substantial place in the training of engineers. In the first tuition period, covering three to three and a half years, general science is studied and, on this basis, there is a more intensive study follow-up devoted to a narrower field of science and technology. To illustrate: during the first term, students of the chemical faculty take courses in inorganic, organic, physical, colloidal, and analytical chemistry, mathematics and physics. In a second stage, they go deeper into the study of more specialized subjects such as high-molecular substances, radio-chemistry, or albumen chemistry.

In preparing specialists with a wide range of knowledge, the curriculum provides for many hours devoted to general scientific and general engineering subjects. The proportion of study time in technical institutes allotted to individual 'cycles' is as follows: general science - up to 40 per cent; general engineering - 25-40 per cent; specialized subjects - 20-25 per cent; socio-economic - 8-10 per cent; sport - up to 3 per cent. In some VUZy, such as building construction institutes, specialized subjects account for about 40 per cent of the total number of hours in the curriculum.

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[1] Practical training in the enterprises.

In the curriculum for radio engineering, 390 hours are allotted to the study of social sciences (history of the USSR Communist Party, political economy, dialectical and historical materialism). Of this total, 200 hours are allocated for lectures and 190 hours for seminar work. For the study of general scientific subjects - higher mathematics, physics, general chemistry, theoretical mechanics, descriptive geometry, draughting, general electrical engineering and other subjects - 2,520 hours are allotted; 1,100 of these are for lectures and 1,420 for laboratory work, practical work and the execution of 'course' projects and work. Specialized subjects - electronic and ionizing apparatus, electrical radio materials, electricity feeder for wireless sets, etc. - 1,605 hours are allotted, divided into 937 hours for lectures and 668 for laboratory and project exercises. Practical work periods amount to twenty-two weeks, and thesis preparation, sixteen weeks.

Instruction in theory is given by means of lectures, laboratory and practical work, exercises, seminars, and discussions. The relative amount of time devoted to each varies according to the subject being studied. For instance, out of 5,200 hours devoted to the study of chemistry at Moscow State University, 2,100 are allotted to lectures, about 1,700 hours to the laboratory, and about 1,400 hours to practical and seminar studies.

Attendance at lectures and practical lessons is compulsory in USSR higher educational schools.

Many courses in higher technical institutes include lessons in calculation, draughtmanship and project planning. These are the first efforts by students to apply their theoretical knowledge independently. When they have finished studying a particular subject and have done the prescribed drawing and calculation, the students proceed to the projects, whose scope, subject-matter and character are set by the departments.

Each project is carried out by the student alone. The role of the instructor is confined to consultation and verification of the work executed. In the case of consultations, the rule is that the student must not be prevented from using his initiative, must not be given ready-made solutions for the problems that rise, must not be allowed to copy blindly projects that have already been worked out. On the contrary, every encouragement is to be given to developing creative faculties in the specialists being trained.

In institutes teaching the humanities, project assignments are set in the basic subjects. During a single term or the whole scholastic year one assignment is executed which the student selects from a number set by the departments.

In order to give students a deeper theoretical knowledge of subjects, the staff of the department deliver lectures on optional subjects. Students select one or several courses each year.

A prominent place is occupied by industrial training, as this brings higher education nearer to life and industry. In order to accomplish this, it has proved necessary to review the whole content of teaching procedure, because the student's productive labour of various kinds and at various instruction stages has now become an organic part of this process.

In accordance with the law of 1958, higher educational institutes plan so that students can master, while employed in industry, the techniques of labour, become familiar with production, understand the structure of the enterprise, gain an idea of how the costs of production are computed, the factors governing a rise in labour productivity, and the technology, economics and organization of production. All of this serves as a sound basis for the further study of specialized technological and economic subjects at the VUZy.

The law also made necessary systematic improvements in the methods and content of teaching. The curricula and programmes of higher technical institutes now include study of the latest achievements in science, technology and practice. Students of higher technical institutes, besides studying mathematics, are made familiar with mathematical computers and programming machines; study of physics is supplemented by such important new subjects as semi-conductors, industrial electronics, the utilization of atomic energy for peaceful purposes, etc. The general chemistry course has been amplified by study of the new synthetics and other chemical substances or materials used in technology. A considerable amount of the training of engineers is devoted to problems of automated production and mechanized units. In recent years, great efforts have been made to improve the economic background of specialized engineers and also to broaden their knowledge and experience in the field of organizing production.

Depending on the type of VUZ, the concluding stage in the training of specialists is the state examination or graduation project. From four to six months of teaching time are allotted to this.

A wide range of subjects is covered by projects submitted for degrees at higher technical institutes. Depending on what the student has specialized in, he is generally given the problem of assembling or designing a project for complicated parts of a locomotive, motor vehicle, aeroplane, factory, workshop, mine, or electricity works.

In the case of some specialized university subjects, the practice is to assign experimental scientific research of somewhat limited scope. In a technical VUZ, however, preference is given to a project that will enable the student to complete and consolidate his engineering training. In carrying out a project the student works almost completely by himself. The instructor, or more frequently, the works specialist, acts only as a consultant, keeping an eye on the student's work. Sometimes graduate projects are replaced by research work of an experimental character.

Projects and assignments submitted for a diploma are defended or argued before a state examinations board composed of representatives of the branches of industry concerned.

Diploma projects serve primarily an educational purpose, but the subjects are connected with concrete industrial problems. They frequently have a practical application and substantially effect construction work and industry in the transformation and improvement of equipment or technological processes.

Great attention is paid in USSR higher technical institutes to fostering the students' scientific work. One of the ways of involving them in research is through the students' scientific societies (SSS). These are to be found in almost every institute and they do worth-while work in discovering and shaping future scientists. Working under the direction of institute lecturers, SSS members in different clubs carry out scientific research, organize scientific excursions and expeditions, and take part in conferences, competitions and exhibitions.

Despite these student activities, in present-day circumstances this would not of itself ensure adequate participation by students in scientific research work. Accordingly, students' consultant and planning services have been formed in a number of institutes which execute orders from enterprises for real consulting and planning work. The advantage of this system, corresponding in its aim to the content of the instruction given, lies in the fact that it enables higher education to be linked both with science and with production, i.e., to attract students to the solution of current scientific problems in the interests and for the needs of production. Activity of this kind stimulates the growth in initiative of future specialists and has a beneficial influence on their over-all development. A number of important scientific-technical and construction engineering problems have been solved in students' scientific societies and students' consulting services. For instance, a students' scientific club, later transformed into an independent students' computer service of the Moscow Power Institute developed a large number of appliances and apparatus of a computer type. The students produced a device for controlling industrial output which, after being 'programmed' by the foreman, proceeded to perform most successfully a series of human functions. The club also produced a machine for the control of the current rate of progress of students. Interestingly, the instrument not only eases the evaluation of the work done by students on current material, but it is a new type of device which serves to introduce cybernetic methods into teaching. This device, in its way, intensifies the potentialities of teachers by relieving them of non-creative, fatiguing and monotonous tasks.

To cite another example, there is the work being done by a computer club for electrical systems in the same institute. This club is working on a number of devices such as an instrument which, with due allowance for several factors, determines the optimum section of wires in electrical circuits; a self-tuning regulator, a device for measuring the load of electricity transmission lines and detecting overloads. A similar device is functioning on the Kuibishev-Moscow power line.

The need to find solutions for scientific and technical problems obliges students to examine critically scientific literature and, instead of merely 'soaking up' the principles enounced, to undertake their verification, seek an answer in them to specific problems; all of which gives the students an interested and creative approach to their studies. These computer societies show that the enthusiasm generated by techniques develops an interest in the problem as a whole, and leads to study of the general scientific, social and philosophical aspects of cybernetics as a science.

Participation in the scientific work carried out in the departments is, of course, the highest form of students' scientific work. At the outset, such participation may be of an auxiliary nature when the student performs various minor technical jobs. He gains an insight, however, into the aims and objects of the over-all investigation. Later on, there is the possibility for students to work by themselves on scientific research which involves the department.

The inculcation of scientific research methods into education tends to raise its level and to produce specialists with a creative, scientific turn of mind.

The best scientific papers produced by students are singled out to receive monetary prizes and awards and are published in scientific proceedings and collections.

C. DEVELOPMENT OF NEW METHODS OF EDUCATION

Great attention is paid in USSR higher educational schools to improving or perfecting methods of instruction, with a view to considerably raising the productivity of labour in this sphere of activity. This is particularly important in our country where every fourth citizen is a student. At present, numerous scientific investigations are going on whose aim is a radical recasting of teaching through computers. The use of such methods is generally called programmed teaching. One of the most important of its objectives is to discover the most rational ways of imparting subject-matter. For this purpose, profound psychological investigations are being conducted and a logico-mathematical theory of pedagogical processes is being formulated. No less important is the determination of the optimum arrangement of curricula (alternations of courses, alternation of subjects within courses).

While the theoretical problems involved in programmed teaching are being worked out, extensive efforts are going on in the construction of teaching machines.

According to the results of preliminary studies carried out in the Moscow and Leningrad State Universities, the Moscow Power Institute and other institutes, the use of programmed teaching methods makes the pedagogical process much more effective. At the Moscow Power Institute, for example, important work on methodology has been done over the years to improve the teaching process. In a laboratory concerned with problems of automation and telemechanization, a group has been working on the important and complex problem of creating a universal electronic machine which can be adapted for different subjects. This group has already put out a number of simple automatic machines to check how much students know. Departments of the institute are doing research on devising simpler machines to do this work, or ways which do not require machines. Experiments at the institute are being made on a method to teach and test students, without machines or specialized personnel and classrooms. This experiment comes from the department of thermal equipment. The department is using programmed non-mechanical instruction in a course on thermal equipment (in the form of lectures with continuous checks on student learning). First of all, the plan and the time-table for the teaching of the course had to be altered, as is shown in table 8.

The lecture part of the course was broken up into nine complete but complementary sections. As a rule, in each section the lecturer taught a group of seven students for four hours. In addition, a two-hour practical period was introduced as well as one period for checking results, usual in programmed instruction.

Table 8. Organization of course on thermal equipment ([a])

Form of training	Number of hours in a semester	
	1962/63	1963/64
Lectures	54	36
Practical exercises	18	18
Group checking	—	18
Laboratory exercises	18	18
Total	90	90

a. The time spent by the students for individual work is not calculated

For the first week of the semester, the test subject was 'heat transmission' which had been taught during the preceding semester and which was the basis for a course in heat exchange, drying and refrigeration plants. Students were informed about the subject to be checked so as to allow them to review its main aspects because it was essential for the specialized course. In the last week, the control period took place during the hours reserved for practical studies.

The number of lectures was cut from twenty-seven to eighteen and about half of the free time was allotted to the period of programmed teaching.

The method of giving lectures was radically changed. Only the most important questions were treated; students were encouraged to study descriptive material for the less complicated installation and construction of equipment. A great deal of attention was devoted in lectures to new materials, formulas, the construction of apparatus, plans and processes developed by science and industry after the textbook has been published. A new instrument which projected plans, drawings and formulas, onto a screen broadened the scope of the lectures and enlarged their content. The lecturer could draw this material on cellophane tape 170 mm. wide before or during the lesson.

The introduction of programmed teaching also changed the character and content of practical studies. The opening section of these studies was used for the analysis of the most characteristic errors made by the students during tests, about which more will be said below. Certainly, there was no ignoring of the most interesting problems which could add to the sum of theoretical knowledge. Students' questions were discussed. Under the old system, students were ill-prepared and remained passive. The exercises were restricted to very simple problems and to the analysis of the methods of calculating the heat of processes and instruments. The new conditions allowed the students, who prepared their course systematically from lecture notes and textbooks, to participate actively in practical exercises, including discussions.

At the end of the semester, the instructor could evaluate objectively the participation and the interest of every student during practical exercises.

The greatest difficulty in the preparation of programmed testing turned out to be the form of examination for each of the nine sections of the course. After a long discussion in the department, the solution accepted was to phrase the questions in the same way which the instructor used in class. As a result, the simplest method, multiple-choice answers (where a student chooses one of a number of suggested answers), found limited use. Questions were very diverse. For example, students were asked to write in the corresponding box on a control card, the algebraic or differential equations for a number of plans or, to put down a formula they had memorized, show how certain dimensions were calculated, make a graph of the stages of a process, translate drawings in mathematical formulas, and so forth. Even the most precise teaching or testing machine cannot yet handle all these varied questions, which can be employed in non-mechanical programmed testing provided that the questions follow logically the sequence of the lectures and the textbook used.

In discussions on programmed teaching, the opponents of its application in schools of higher education argued that this method did not develop creative thinking on the part of students. They were thinking only of the multiple choice method. But the non-mechanical test method permits the preparation of questions in any form and at different levels of difficulty.

Evidently, there are other effective methods of teaching: practical studies with a thorough analysis of the most important questions from the point of view of logical and mathematical relations, laboratory and academic research work, where the instructor can verify the knowledge of the students, sample calculations and the preparation of studies. In the end, this entire complex of teaching and testing develops and encourages creative thinking in students along with the skill to use it rationally in further practical work.

Serious attention is being given also to making wider use of other technical teaching devices: cinema films, television, tape recordings, etc.

All these measures have a common objective - to train all-round specialists with a genuinely scientific outlook on the world. In USSR higher educational schools the whole process of teaching and education is subordinated to this purpose. It is organized in such a way that students obtain a sufficiently full and proper mastery of the basic laws governing the development of nature and society, so that they can freely comprehend these laws and apply them correctly and creatively. In this a great part is played by the study of social and economic subjects, by education in the humanities given to all natural science specialists, engineers, agricultural specialists, doctors, etc. without exception. Contemporary natural science and technology are more and more closely intertwined with the social problems of mankind; therefore any specialist, whether he is a natural scientist or an engineer, must understand the principles, methods and deductions of the history of society, its structure and the natural laws of its development. Only through familiarity with the scientific facts about man himself can the specialist solve the problems implicit in his practical activities. That is why all future engineers, agriculture specialists, doctors, economists, and teachers study both natural and economic sciences, philosophy, historical subjects, and later as optional courses, ethics and aesthetics. The teaching of humanistic subjects helps to prepare specialists to think properly, to overcome one-sidedness in the development of personality, and to avoid a dogmatic and scholastic outlook; they are prepared in the spirit of free, scientific research. We have already mentioned the percentage of humanistic studies in engineering institutes. In the case of specialized natural science subjects the proportions are: chemistry, 27 per cent; biology, 28 per cent; geology, 23 per cent; physics, 22 per cent; and mathematics 27 per cent, of the total number of teaching hours in the curriculum.

At the same time, great importance is attached in USSR higher educational schools to giving the students of humanistic institutes and specialized trades an education in the exact and natural sciences. Life insistently requires the natural science specialists and technicians to have a wide general technical and socio-political outlook. With equal force, it requires specialists in the field of the humanities to have some degree of knowledge of the achievements of contemporary natural science and mathematics. These sciences have been making enormous advances in learning the laws of nature and their effects on everyday life and existence; their social functions expand more and more widely. Thus, the exact and natural sciences are becoming an increasingly important element in the life of society and thereby one of the subjects in the study of the humanities. Nor is it being overlooked that many philosophers, economists, lawyers, historians and others often become state, administrative and social workers. If anyone is successfully to become the directing force in a particular section of society where all spheres are saturated with science, technology and economics, it can only be a person who understands these problems. It goes without saying that the importance of the natural sciences is not the same for specialists in the various humanistic sciences. Economics, for instance, is closely connected with nature. Jurisprudence, on the other hand, is more remotely and indirectly linked with it.

In the law and journalism faculties of Moscow State University, there is a course in formal logic, in which some information is conveyed about mathematical logic, closely connected with mathematics. In the department of theoretical and applied linguistics, a course of 776 hours in all is given on 'The principles of higher mathematics' which constitutes 18 per cent of the 4,266 study hours.

Great attention is devoted to the study of mathematics and cybernetics in the economics faculty of the university, especially in the department of mathematical economics. Here the subjects taught are higher mathematics' mathematical analysis, 300 hours; algebra, 400 hours; theory of operations in linear programming, 270 hours; theory of probability, 140 hours; theoretical statistics, 90 hours. Altogether, 1,200 hours are devoted in this department to these sciences, which constitutes about 30 per cent of the total teaching time amounting to 4,150 hours. In another department of the economics faculty - political economy - students also spend considerable time on mathematical subjects: higher mathematics, 200 hours; theoretical statistics, 90 hours, mathematics of design and planning economics, 70 hours, or 9 per cent of the 3,924 hours.

The fullest exposition of natural and mathematical sciences is given in the faculty of philosophy which has three departments: philosophy, logic and psychology. Among the compulsory subjects in the philosophy department are higher mathematics, 136 hours; general physics, 168 hours; chemistry, 100 hours; biology, 140 hours; physiology of higher nervous activity, 72 hours. This makes a total of 616 hours or 13.6 per cent of the 4,540 hours. In the department of logic, students do a course in higher mathematics, 136 hours; and basic mathematical logic, 136 hours. This makes for 272 hours or 6 per cent of the total number of instruction hours of 4,540. In addition, this department has introduced an optional course in mathematical logic, of 432 hours.

An example of the maximum saturation in natural science and mathematical subjects is furnished by the psychology department. This department teaches seven natural science or mathematical subjects, viz., higher mathematics, 272 hours; principles of biology, 72 hours; human physiology, 204 hours; anatomy and evolution of the nervous system, 136 hours; physiology of higher nervous activity, 172 hours; neurological principles of psychology, 60 hours; and anthropology, 64 hours. Associated with these is a course in 'Application of mathematical methods in psychology', 72 hours, which explains the elements of the theory of probability and information theory. The total number of hours scheduled in the curriculum for these sciences amounts to 1,052, or 22.1 per cent of all teaching time amounting to 4,752 hours.

These proportions observed in the humanistic faculties of Moscow State University are, with a few particular variations, typical of the other universities and corresponding humanistic institutes in the USSR.

No description of the teaching and education given to students in USSR higher educational schools would be complete without a word about the very important part played by optional courses. The fact is that in USSR institutes, in addition to compulsory activities, there has been an intense and varied development of training in social vocations like club work, in which most of the students take a part, depending on their bent and interests.

Every institute has a large number of clubs - literary, drama, ballet dancing, etc. Musical and choral societies are extremely active and performances are very often given in foreign languages.

Physical culture has become an indispensable component part of the whole educational and training process in institutes as a means of strengthening the health, and improving the working capacity of students.

In higher educational institutes physical culture is practised throughout the entire period of the students' training and takes the form of class lessons both compulsory and optional; physical exercises during school hours - physical culture intervals, production gymnastics, etc.; lessons outside teaching hours in the sports sections and teams for different forms of sport under the direction of private instructors; or of large-scale health, physical culture and athletic activities.

The lessons in physical culture and athletics given in institutes are organized in accordance with the state of health and the physical and technical adaptability of students, bearing in mind their interests.

D. SCIENTIFIC WORK AND THE TRAINING OF SCIENTIFIC PERSONNEL IN INSTITUTES

USSR higher educational schooling is closely bound up with the development of science. More than half the professors and doctors of science in the country are to be found in the higher educational establishments. The many thousands of postgraduates in VUZy constitute a reserve auxiliary force for research work such as no other scientific institution possesses.

In recent times, the USSR has seen the development of a whole series of new branches of science. Intensively cultivated in higher educational institutes, they include atomic nuclear physics, atomic crystallo-physics, chemistry of chain reactions, biogeochemistry, higher mathematics, electronics, theory of semi-conductors, automation and telemechanics, etc. Recently also, thirty-two scientific-research institutes have set up 290 'problem' laboratories to study major problems in theoretical and applied science. In addition, 340 branch-trade laboratories have been established, either financed by the economic organizations attached to institutes, or directly in the enterprises. These execute work on a programme agreed on with the said organizations.

On an ever-increasing scale, engineers, technicians and workmen in factories are working in these laboratories, which are becoming scientific centres sui generis. The expansion of the network of such scientific research laboratories will, no doubt, create still more favourable conditions for technical advancement.

The above does not mean, of course, that higher educational schools are seeking to monopolize science. The country has a large number of scientific institutions such as the USSR Academy of Sciences with its widely developed network of institutes. Alongside these institutions and in close collaboration with them, the higher educational school performs a great volume of work in the most varied fields of science.

The high level of development in scientific investigations and the availability in institutes of a qualified staff of professors and lecturers makes it possible to train, successfully and on a wide scale, not only specialists for enterprises but future scientists as well.

In the USSR paramount importance is attached to the training of science teachers. This is understandable since progress is possible in science, higher education and higher levels of scientific and technical attainment only if the country has at its disposal very large staffs of highly qualified scientists.

With industry and science developing at their present level, science specialists are needed not only for scientific research and teaching work, but also for work in industry, and especially in designing new equipment. In the USSR everything is being done to ensure a steady influx of gifted young people into science work. The wide expansion of higher education in the country offers the necessary conditions. A taste for science and creative skills is inculcated in every possible way from the first day the young student enters a higher educational institute. New scientific matter is included in curricula and obsolete matter dropped in frequent revisions of courses. Teaching methods are organized to induce the student to think creatively and not merely to recite ready-made formulae. The teaching of science is closely linked with scientific research work; students join professors in executing scientific projects in laboratories. It is becoming more and more frequent for students to spend a certain period of time doing practical laboratory work in scientific-research institutes and the submission of diploma thesis is widely practised in scientific institutes and in factories. Higher educational institutes are allowed considerable initiative in transferring the students who are making most progress, to follow an individual curriculum which will include research work in laboratories or scientific institutes. Such students can attend lectures when they wish. All this offers enormous possibilities for the enrolment of pupils in institutions preparing science specialists. Each professor can pick out the bright students who are making the most progress in order to train them as future scientists.

In our country, specialists in science teaching are prepared chiefly on post-graduate lines, in the larger higher educational and scientific research institutes. Talented graduates of universities and institutes, and also industrial students with higher education who show a bent for scientific work, are admitted to post-graduate study. Over a three-year period post-graduate students, working under the direction of experienced professors, train for a scientific career. They make a thorough study of philosophy, a foreign language, mathematics, familiarize themselves with the newest scientific theories, take a course in pedagogy and do scientific-research work in a specialized subject. Post-graduate training is not merely a course of study, it also means creative activity. It terminates, as a rule, with the student submitting a thesis for the academic degree of 'kandidat' of science. Some future teachers are trained in departments of institutes and in the laboratories of scientific-research institutes. They are chosen from the most capable assistants and scientific collaborators, who also prepare and sustain their thesis for the academic degree of 'kandidat' of science.

In 1964 more than 83,000 persons were undergoing post-graduate training in the USSR, and the rate at which science specialists are being trained is increasing each year. In this connexion it may not be without interest to cite figures showing the number of post-graduate promotions in the USSR. These can be seen in table 9 (overleaf).

Table 10, also overleaf, shows the number of post-graduates, by branch of study, at the end of 1964.

Post-graduate study by correspondence is very widespread in the USSR. It attracts both young assistants, lecturers and scientific collaborators in institutes and research institutions, as well as workers in industry (engineers, economists, teachers, lawyers, agricultural engineers, doctors, and other specialists).

Table 9. Numbers of post-graduates by type of instruction and yearly graduations

	Full-time training			Training while employed			Total		
	1940	1960	1964	1940	1960	1964	1940	1960	1964
Total number of post-graduates	13 725	22 978	47 928	2 438	13 776	35 343	16 863	36 754	83 271
Higher educational institutions	11 506	13 463	31 192	1 663	6 943	18 331	13 169	20 406	49 522
Scientific institutions	2 919	9 515	16 737	775	6 833	17 012	3 694	16 348	33 749
Total number of yearly graduations	1 865	4 125	10 953	113	1 392	4 367	1 978	5 517	15 320
Higher educational institutions	1 411	2 407	6 886	61	613	2 227	1 472	3 020	9 113
Scientific institutions	454	1 718	4 067	52	779	2 140	506	2 497	6 207

The scale on which the training of scientific specialists has expanded in our country is a result of the growing demand in the national economy and culture. Their degree theses must deal with the most pressing problems in scientific and practical work. Scientists who already hold the degree of 'kandidat' of science are given facilities for completing their theses for doctor's degrees. Hundreds of these science teachers are given 'creative' leaves of absence for one or two years with complete exemption from teaching duties but full salaries.

The description above shows that in the USSR both the quantity and quality of the training of intellectual specialists are developing rapidly and will go on developing in the future. This growth will augment the ranks of both the professional intelligentsia and persons in the non-professional category. The process of erasing the basic differences between classes goes hand in hand with the qualitative changes that are occurring in the class structure of society and are leading to the disappearance of classes and the elimination of substantial differences between manual labour and intellectual work. Changes in quality derive from an increase in the numbers of technical engineering, agricultural engineering and other specialists and a rise in the relative proportion of intellectuals in the social structure of the community. The dialectics of development are such that the process of erasing the boundary lines between the intellectuals and people engaged in manual labour will go on, not by reducing the numbers of the former or eliminating them, but by getting rid of class characteristics. And the fact that in the USSR, for the first time in history, worker-intellectuals and kolkhoznik-intellectuals are being produced is practical confirmation of the process that is going on in the country. It must not, however, be imagined that raising the educational level will occur instinctively or automatically without a great effort or organization on the part of official and private bodies. This results from the provision of objective conditions for popular education - ensuring proper objective facilities and planned principles for education. For this reason all education in the USSR grows and develops in accordance with the requirements of a planned socialist economy, of culture and science and the personal inclinations and interests of the people.

Table 10. Numbers of post-graduates, by branch of study, at the end of 1964

Branch of study	Numbers of post-graduates: Total	Higher education	Scientific institutions
Total	83 271	49 522	33 749
Of which:			
Physics-mathematics	8 895	5 973	2 822
Chemistry	4 735	2 652	2 083
Biology	5 502	2 305	3 197
Geology and mineralogy	2 633	1 251	1 382
Technology	32 191	17 909	14 283
Agriculture and veterinary science	6 731	3 394	3 337
History and philosophy	3 913	3 067	846
Economics	6 398	4 172	2 226
Geography	814	516	298
Literature	2 422	1 956	476
Law	722	532	190
Pedagogy	1 734	1 241	493
Medicine and pharmacy	5 245	3 633	1 582
History of art	854	673	181
Architecture	471	218	253

Part Two

Planning of education in the USSR

Introduction

DRAFTING OF PLANS FOR THE DEVELOPMENT OF EDUCATION

Planning the development of the national economy of the USSR, including education, is conducted on the basis of democratic centralism: that is, workers participate widely in the drafting and discussion in enterprises, organizations or educational institutions and, later on, at sessions of the Supreme Soviet of the USSR. Once approved, the plans are carried out to the letter.

Proposals for the development of education (secondary-general, vocational-technical, secondary specialized, and higher) are drafted by workers, scientists and teachers in educational establishments; managerial staff and specialists in enterprises and organizations; and in ministries, departments, Party, trade-union and komsomol organizations. It would be practically impossible here to enumerate all the ways in which this is done; however, some idea of the process can be formed from the following account.

To begin with, the general objectives are set out by the USSR Gosplan. Where it becomes necessary to modify previous indices, tables or methods of compiling these instruments, the suggestions are discussed at meetings of representatives of educational institutions. Their observations and proposals, together with those of ministries and departments and other interested groups, are weighed by the Gosplan before it finally frames a programme. Once it has been approved, all organizations must adhere strictly to the plan.

The Council of Ministers of the USSR has set out the procedures and deadlines for framing the national plan and the indices, tables and instructions. In consequence, the ministries and departments concerned with higher and vocational-technical education issue instructions to institutions under their jurisdiction. In turn, the educational establishments consult a large number of teachers and scientists before framing their plans for specialist training. Workers in enterprises or organizations for which the school will be training future specialists are also consulted on present needs and future possibilities. The draft plans are then submitted to the relevant ministry or department, along with all the necessary economic data and supporting evidence. Thus, the framing of a plan for the preparation of skilled workers and specialists starts with the educational establishment. The ministries and departments, in their turn, join with the representatives of educational establishments and other interested organizations in considering these proposals and on the basis of the latter, they work out a composite plan for the preparation of skilled workers and specialists. At these discussions, the educational establishments 'defend' their proposals, that is to say, advance economic arguments in favour of their adoption. This, of course, does not mean that the composite draft plan of a particular ministry or department is merely a mechanical collection of proposals from the educational establishments. The plan takes into account all the proposals. It naturally adopts only those which are fully justified on the need for skilled workers and specialists, and the possibilities that exist in particular educational institutions for their most economical and effective training. Special methodological commissions, groups of scientists and specialists in a particular branch of education, take part on a regular or ad hoc basis in considering the proposals.

Such composite plans for the preparation of skilled workers and specialists are then discussed at meetings between boards of ministries and departments and directors of educational institutions, as well as scientists and specialists in the different branches of national economy and culture. Account is taken of all the previous discussions on the proposals of the educational establishments.

In the Union republic Gosplans, as well as the USSR Gosplan, these draft plans are first discussed in the divisions responsible for planning the development of education. In the USSR Gosplan this division is at present called the division of culture and education. It enlists the services of representatives of the ministries and departments in charge of educational establishments. These include the Ministry of Higher and Secondary Specialized Education of the USSR, the ministries (committees) of higher and secondary specialized education of the Union republics and their ministries of education. Also consulted are the State Committee for vocational-technical training and others, as well as the relevant ministries and departments which utilize skilled and specialized workers, and such organizations as the Ministry of Finance of the USSR, the State Committee of the Council of Ministers of the USSR on labour and wages, the Academy of Sciences of the USSR and others. The plans are also discussed by the board of the USSR Gosplan with the participation of all the Union republics and ministries and departments. Scientists and heads of educational establishments also take part in these discussions. Only after such multi-stage and detailed examinations, in which the role of the educational establishments is very large, does USSR Gosplan submit its draft plan for the preparation of skilled workers and specialists to the Council of Ministers of the USSR as part of the national economy plan and closely co-ordinated with the development indices of the various branches of national economy and culture.

The USSR Gosplan implements the programme of the CPSU, the directives of the Central Committee of the Party and the decisions of the Council of Ministers. The principal objectives of the USSR Gosplan are to guarantee in national economic plans the orderly and systematic development of the national economy, increased efficiency of production by the application of the economic laws of socialism and the advantages of the socialist way of production so as to create the material-technical base of communism, and a steadily rising standard of living for the population.

With the participation of Union republics, of ministries and departments of the USSR, Gosplan drafts annual and long-term plans for the development of the economy of the USSR in its entirety, for Union republics, for ministries and departments of the USSR, and for all the branches of the national economy, including education. It combines centralized state planning with, where appropriate, broad economic initiative for enterprises and organizations in order to stimulate industrial and agricultural production. This provides the balanced co-ordination of all aspects of the national economy.

The structure of the USSR Gosplan determines the order of preparatory work on draft development plans. There are:

1. 'Branch' divisions which plan the development of specific branches of the national economy as 'branch' divisions of agriculture, transport, chemical industry, culture and education, etc.
2. Divisions of balance whose duty it is to decide the balances and plans for distribution of different aspects of production on the basis of proposals made by the 'branch' divisions and of draft plans from Union republics, ministries and departments, for example, the distribution of heavy and light metals, the department for the distribution of fuel and oil products.
3. General divisions for the different parts of the plans, such as the division for capital investment, division for material balances and plans of distribution, division of finance and cost, division of industrial labour, wages and labour resources, etc.
4. Over-all division for the national economic plan which co-ordinates the working out of draft plans with regional planning to assure balanced distribution of industrial strength throughout the USSR.

The USSR Gosplan employs the services of a main computer centre as well as of the economic research institutes, the office of prices, the council for the study of production, the institute for transport problems and other organizations.

The cultural and education 'branch' division comprises the following: a cultural sub-division; an education sub-division, which plans the development of all types of general education schools including pre-school centres for children; a sub-division for the training and re-assignment of specialists, which is concerned with drafting plans in the fields of higher and secondary specialized education, as well as with the planning of their placement among different agencies; and sub-division of labour, productivity, wages and labour resources, which plans the training of workers in vocational and technical schools.

It should be noted that the 'branch' divisions play an important, and even decisive, part in the drafting of plans for the development of any given sector of economic activity. In co-operation with interested organizations, they analyse in detail all draft plans submitted to them by the Union republics, ministries or departments. Such analysis is based not only on indices included in the draft of the General Economic Plan, but also on a number of intermediate data. In addition, these 'branch' divisions study both the technical and the economic validity of such drafts, and work out proposals for effective and economically sound comparative rates of development of different industries. (In the field of culture and education, for example, the 'branch' division formulates suggestions concerning different types and forms of education.)

Each 'branch' division prepares a draft outlining the development planned for the relevant activity, both within the framework of the country as a whole and within each Union republic, ministry or department. These outlines cover all the basic indices, calculations and background information. The 'branch' divisions are also called upon to 'defend' their draft plans, either in toto or in part, before the competent divisions of balance and the general divisions. (Thus, for example, all plans dealing with manpower requirements must be 'defended' before the 'branch' sub-division of labour productivity, wages and labour resources; likewise, 'defended' plans concerning financing must go to the 'branch' sub-division of finance and production costs, while investment plans go before the general investment sub-division.) When their draft plans are examined by Gosplan, branch divisions take part in the discussion.

The main outlines of the plan for the development of education are described in the corresponding chapters of Part Two of this study. Here, we are concerned with the general contents of long-term plans (five years or more) and annual plans. The programmes follow the same format and, in the five-year plans, cover each year separately. Information includes:

1. The development of networks, that is, the number of students in various types of schools; the admission and graduation of students in vocational-technical schools, secondary specialized and higher educational institutions.
2. The volume of investment required for expanding education, including construction plans and financing.
3. The number of persons employed in educational institutions.
4. The financing necessary for the maintenance of educational institutions to be included in the state budget.

Each of these factors is spelled out for the country as a whole and for each Union republic, ministry and department with educational institutions.

The USSR Gosplan presents the draft plan to the Council of Ministers of the USSR as a single programme for economic development for the year or the five-year period. In all, three documents are presented: the report on the draft plan with an explanation of the basic goals and proportions with regard to the economy as a whole; the draft plan itself, with a detailed exposition for each branch and, when a five-year or longer programme is presented, statistics on the fifth year; finally, specific objectives for each year, including statistical analyses of the technical-economic basis of the draft.

ADOPTION OF PLANS FOR THE DEVELOPMENT OF EDUCATION

The USSR Council of Ministers discusses the draft plans with all the interested organizations and scientists, and, after it has been approved, submits long-term plans for consideration to the Central Committee of the CPSU and the current plans to the Supreme Soviet of the USSR.

Before the proposed national economic development goals - including those for the development of public education - are considered at sessions of the Supreme Soviet of the USSR, they are widely discussed in committee, particularly in the Economic Committee of the Soviet of Nationalities and the Budget Committees of the Soviet of the Union and of the Soviet of Nationalities. These committees consider reports presented by the USSR Gosplan, the Ministry of Higher and Secondary Specialized Education of the USSR, the Ministry of Public Health of the USSR, the Ministry of Culture of the USSR, the Ministry of Education of the RSFSR and other organs on the draft plan for the development of education, culture, public health and the training of specialists for the planning period. They also examine relevant estimates and support economic arguments. Members of the Soviet parliament who work actively in varied sections of communist society, who live in every part of the country and are fully familiar with the interests of their electors, render great help in the final drafting of the plan.

Every year the Supreme Soviet of the USSR enacts legislation on the state plan for economic development and on the USSR state budget for the planning year. It also approves the state plan for the following year, prepared by the Council of Ministers of the USSR jointly with the councils of ministers of the Union republics, state committees, ministries and departments of the USSR. This is subject to amendments submitted by the budget committees of the USSR and the Soviet of Nationalities and the Economic Committee of the Soviet of Nationalities and confirms the basic targets of the state plan for national economic development.

Long-term plans are considered at the congresses of the CPSU, which also issues directives on the development plan for the relevant period.

These directives, usually for a five-year period, establish the basic goals of national economic development, including public education, in the light of the main tasks which face the Party and the Soviet people. The congress directives form the basis for current plans for the development of the national economy.

As we have already mentioned, the directives for the five-year plan only approve the basic goals for the final year of the plan; but they determine and are determined by the estimated targets for the plan's intermediate years. This permits the yearly plans to take into account the fulfilment of the plan in the preceding year, and thus to find the best variants for development of the economy of the country during the planned year.

The most important task of all the organs engaged in the planning of education is to co-ordinate these plans with those for the development of the other branches, so as to ensure the harmonious development of the USSR as a whole, of the various Union republics and economic regions. The main instrument of this co-ordination is the wide utilization of balance sheets; some of the methods thus applied in educational planning are described in chapter 1.

Chapter 1

Planning of national education and balance-sheet of labour resources

The construction of a communist society is the ultimate aim and the motivating force of the social and economic transformation of the USSR initiated by the October Revolution. A very important role in the solution of this basic task is the national use of labour resources, as one of the main factors in the country's economic strength and the growth of the people's prosperity.

Section I

SUMMARY BALANCE-SHEET OF LABOUR RESOURCES

In the planned economy of the USSR, the indispensable condition for development, including that of public education, is to draw up a summary balance-sheet of labour resources. The object is to ensure their most rational use so that sufficient qualified workers and specialists will be available and full employment achieved.

The preparation of a balance-sheet of labour resources presupposes the following: (a) a determination of quantity, based on computing the population figures by age-groups; (b) an analysis of statistical data on the utilization of labour resources, so as to bring to light the problems that arise and outline ways of solving them; (c) the utilization to the utmost of local labour resources and also the transfer of able-bodied workers from regions with surplus manpower to regions in short supply; (d) full employment in the various regions of the country and especially in regions with surplus manpower resources.

The objectives in the summary balance-sheet of labour resources are brought into line with the goals for all sections of the national economic development plan, reflecting the growth in the volume of production, the development of education, culture, health and public service institutions; the figures take into account the distribution of productive forces in the USSR, in each Union republic, economic region and province. To ensure the most logical inter-relation of all the objectives, several variants of the balance-sheet are computed so as to select that one which would most adequately solve the problems of manpower and full employment. In this way, the summary balance-sheet of labour resources positively influences the shape of the national economic plan, and constitutes the basic instrument for planning the rational use of manpower.

The summary balance-sheet is worked out separately for urban and rural districts, for the USSR as a whole and for the Union republics, larger economic regions, territories and provinces in accordance with the model form in annex I. Along with targets, the balance-sheet also shows the availability and distribution of manpower for the year preceding the planning period, as well as the figures for the current (base) year. The summary long-term balance-sheet of labour resources is prepared for each year of the planning period, based on the annual average for workers; and in the case of the kolkhozes, on the month of maximum agricultural activity.

A. THE DETERMINATION OF THE AMOUNT OF LABOUR RESOURCES

Labour resources are estimated on the basis of the calculation of the population figure by age groups.

1 Estimates of population numbers by age group

Estimates are made by the statistical organs. In the USSR, those are the Central Statistical Office of the USSR Council of Ministers and its organs in the Union republics, territories and provinces. Relevant data may be obtained from them whenever required. Approximate estimates of a particular age group can be made on the basis of data for recent years as well as at the start of the planning period, the birth-rate and death-rate per 1,000 of the population by age groups (or the coefficient of life expectancy) and the natural increase in the population. A grouping of the population by age is necessary in order to determine the probable number of pre-school and school-age children, of able-bodied persons and other index factors.

Statistical data show that in the USSR, over the last fourteen years, from 1950 to 1963 (table 11) the number of births per 1,000 of the population went from 26.7 to 21.3, that the number of deaths per 1,000, following the growth in material well-being and the improvement in health services, fell from 9.7 in 1950 to 7.3 in 1963, while the natural yearly increase amounted to 17 per 1,000 in 1950 and to 14 in 1963. In the USSR the general death-rate fell more than four times by comparison with the pre-revolutionary death-rate and is, at the present time, the lowest in the world. Infant mortality had diminished nine times.

Table 11. Birth-rate, death-rate and natural growth of population in the USSR

Year	per 1,000 inhabitants			Deaths per 1000 births of children up to one year
	Number of births	Number of deaths	Natural growth	
1913	47.0	30.2	16.8	273
1940	31.3	18.1	13.2	184
1950	26.7	9.7	17.0	81
1951	27.0	9.7	17.3	84
1952	26.5	9.4	17.1	75
1953	25.1	9.1	16.0	68
1954	26.6	8.9	17.7	68
1955	25.7	8.2	17.5	60
1956	25.2	7.6	17.6	47
1957	25.4	7.8	17.6	45
1958	25.3	7.2	18.1	40.6
1959	25.0	7.6	17.4	40.6
1960	24.9	7.1	17.8	35
1961	23.8	7.2	16.6	32
1962	22.4	7.5	14.9	32
1963	21.3	7.3	14.0	30

The size of the population for a planning year can be determined by the formula:

Formula 1

$$P_p = P_b \cdot C_1 \cdot C_2 \cdot C_3 \ldots C_n$$

where:

P_p = Size of the population in the planning year

P_b = Actual figures of population in the base year

C = Coefficient of the natural increase in population in each planning year

n = Number of years in the planning period.

If the natural increase in the population for each planning year is identical, the formula takes the form:

$$P_p = P_b \cdot C^n$$

It should be said that estimates produced under this formula make no allowance for shifts of population to different regions of the country. While this is of no importance in estimating the presumptive size of the population as a whole in the USSR, possible shifts of population must be allowed for when estimating the probable population figures in the various Union republics and particular geographical areas of the country. In a number of the Union republics and regions of the USSR, because of the differing age structure of the population and for certain other reasons, the natural increase per 1,000 differs from the average rate of increase for the country. The estimates make allowances for this.

If we have data for the probable population figures for each planning year, we can by reckoning the birth-rate per 1,000, determine the number of births in each such planning year.

The population figures by age group are calculated on the basis of the statistical figures for the age-distribution of the population at the beginning of the planning period (in the base year), the estimates of the birth-rate in each planning year and the statistics of the death-rate per 1,000 population in specific age groups or the life-expectancy coefficients.

In analysing the data on distribution of the population of the USSR by age (table 12), it should be noted that the percentage of the population in the older age groups rose considerably in 1959, as compared with 1939 (the population census years), and there was a drop in the percentage of the population in some other age groups; this is due, on the one hand, to the increase in the life-expectancy of the population and, on the other, to

Table 12. Distribution of population of the USSR by age group in 1939 and in 1959 (in thousands)

Distribution by age group	Number of inhabitants		As percentage of whole population		1959 as percentage of 1939
	1939	1959	1939	1959	
Total population	190 678	208 827	100	100	109.5
of which					
0-9	46 476	43 363	22.8	22.2	107
10-15	28 365	17 133	14.9	8.2	60
16-19	13 030	14 675	6.8	7.0	113
20-24	15 786	20 343	8.3	9.7	129
25-29	18 550	18 190	9.7	8.7	98
30-34	15 598	18 999	8.2	9.1	122
35-39	12 958	11 590	6.8	5.6	89
40-44	9 603	10 408	5.0	5.0	108
45-49	7 776	12 264	4.1	5.9	158
50-59	12 533	19 146	6.6	9.2	153
60-69	8 535	11 736	4.5	5.6	137
70 and over	4 462	7 972	2.3	3.8	179

Table 13. Death-rate of population of the USSR by age group (number of deaths per 1,000 inhabitants)

Distribution by age group	1896-97	1926	1938-39	1958-59	1960-61
Total population	32.4	20.3	17.3	7.4	7.2
0-4	133.0	78.9	75.5	11.9	9.9
5-9	12.9	7.3	5.5	1.1	1.0
10-14	5.4	3.1	2.6	0.8	0.7
15-19	5.8	3.7	3.4	1.3	1.2
20-24	7.6	5.5	4.4	1.8	1.8
25-29	8.2	6.1	4.7	2.2	2.1
30-34	8.7	6.3	5.4	2.6	2.7
35-39	10.3	7.5	6.8	3.1	3.0
40-44	11.8	9.0	8.1	4.0	3.7
45-49	15.7	10.9	10.2	5.4	5.4
50-54	18.5	14.0	13.8	7.9	7.5
55-59	29.5	18.1	17.0	11.2	10.9
60-64	34.5	24.7	24.4	17.1	16.6
65-69	61.6	36.5	35.0	25.2	24.5
70 and over	89.0	79.5	78.6	63.8	63.1

the lower birth-rate and losses of human lives during the Second World War. It can be expected that in subsequent years the percentage ratio of population age groups will change substantially.

Statistical data for the death-rate of the USSR population by age group (table 13) enable us to determine the number of people per 1,000 births who will survive to a particular age. This figure, or the coefficient of life-expectancy in the USSR, is increasing every year. Thus, for example, whereas the coefficient figure for children surviving their first birthday was 0.816 in 1940, it rose to 0.965 in 1960 and to 0.97 in 1963.

These facts show that, as a result of the enormous progress achieved in Soviet public health services and the growth in material well-being of the Soviet people, the mortality of the population in all age groups, and especially of children under one year of age, is systematically decreasing, and the average life-expectancy of the total population is increasing. It rose from 32 years in pre-revolutionary Russia (according to figures for 1896-97) to 70 in 1960-61.

In view of these trends, there is every justification when estimating the probable figure of population by age group, for applying a somewhat lower death-rate per 1,000 population by age group and a somewhat higher coefficient of life-expectancy, than those actually recorded in the years 1960-61.

2. Determination of available labour resources

Labour resources include: (a) the able-bodied population: men from 16 to 59, women from 16 to 54 inclusive, with the exception of the disabled, and people of working age who receive special old-age pensions; (b) persons who are younger or older than these age groups, but who are actually employed in state, co-operative and public enterprises and institutions.

The age-limits mentioned above for determining labour resources have been fixed on the basis of the law on state pensions passed by the Supreme Soviet of the USSR in 1956, which set the age for receiving a normal old-age pension.

Labour resources are calculated separately for urban and rural districts. Military personnel are not included.

According to the population census returns for 15 January 1959, the number of able-bodied persons did not decline after the war. Instead, it actually rose from 102 million in 1939 to 119.8 million in 1959, that is, by more than 17 per cent.

Since the national economy is planned, full employment is provided for the able-bodied population. The number of workers and employees engaged in the national economy is rising steadily. Thus, whereas in 1940 the average annual number of workers and employees in the country (not counting those in kolkhozes but including members of producers' co-operatives) amounted to 33.4 million, in 1963 it rose to 76.9 million. In addition, able-bodied persons are employed in kolkhozes, are full-time students or are engaged in domestic and personal service occupations.

In the long run, the average annual number of people employed in the USSR national economy, including kolkhozes, will increase faster than the increase in population. Several factors will cause this, despite the introduction of universal compulsory full secondary education and the expansion of higher and secondary specialized training. Even if the number of day-release students in educational establishments reaches the higher target figure, the number of those engaged in domestic occupations will decrease more substantially as a result of implementation of the vast programme for the expansion of kindergartens, pre-school centres, boarding schools and extended day-care schools and of women being released from housework. Additional factors will be shorter working hours, further improvements in the geographical location of industry based on the location of labour forces and other measures announced in the CPSU programme.

B. DETERMINATION OF THE NUMBER OF PERSONS ENGAGED IN DIFFERENT BRANCHES OF THE NATIONAL ECONOMY

Estimates of the probable number of persons who will be engaged in each of the different branches of the national economy and culture are based in large part on the plans for development. Among the factors considered are the increase in the gross industrial and agricultural output; the rise in the volume of transport and freight turnover on railways; the increase in capital investment; the growth in labour productivity (despite the projected reduction in working hours); the reduction in administrative personnel; the rise in the number of students; the further improvement in public health services.

The existing structure of the working population employed in the national economy is examined including changes in natural trends or patterns. The growth of production and the number of persons engaged in different branches of the economy, a particular republic or an economic region, are also taken into account.

Employment in the different branches of the national economy (see table 14) shows a steady tendency toward a relative decline in the number of people employed in material goods production, especially in agriculture, compared with sectors such as education and public health, scientific research, and science services. In industry, transport and communications, as well as in some other branches, the number of workers and employees increased absolutely as well as proportionally during the last few years. The rate of this increase,

Table 14. Average annual number of workers and employees in branches of USSR national economy (in millions)

	1940		1955		1960		1963	
	Number	%	Number	%	Number	%	Number	%
Total in national economy (a)	62.4	100	75.0	100	84.3	100	89.7	100
Industry (industrial production staff), including co-operatives	13.2	21.1	19.2	25.4	22.3	26.4	25.0	27.9
Construction (staff employed on erection and assembly work)	1.6	2.5	13.2	4.3	5.1	6.0	5.2	5.8
Agriculture and forestry	32.0	51.3	31.35	42.0	29.8	35.3	28.0	31.2
Transport and communications	3.9	6.2	5.65	7.6	7.0	8.3	7.7	8.5
Trade, public catering, supply of technical materials	3.3	5.3	3.7	4.9	4.7	5.6	5.5	6.1
Housing	1.2	1.9	1.4	1.9	1.9	2.3	2.2	2.4
Public health	1.5	2.4	2.6	3.5	3.46	4.1	3.9	4.4
Education (schools, institutes and cultural institutions)	2.66	4.8	4.0	5.4	4.8	5.7	5.8	6.5
Scientific research and science services	0.36	0.6	1.0	1.3	1.8	2.1	2.4	2.7
Staffs of state administrative bodies, boards of co-operative and public organizations, credit and insurance institutions	2.1	3.4	1.6	2.1	1.5	1.9	1.6	1.8
Other branches (capital repairs, drilling, planning and prospecting organizations, etc.)	0.6	1.0	1.3	1.7	1.97	2.3	2.4	2.7

a. Including number of workers employed in kolkhozes and co-operatives was especially high in construction, public health and scientific research and science services (between 1940 and 1963 inclusive it rose, respectively, 3.3, 2.6 and 6.7 times), whereas the absolute, and more especially the relative, number of persons employed in agriculture and forestry fell as the productivity of labour and the mechanization of agriculture rose.

The changes reflect the priority given at specific stages of socialist construction in our country to the development of one or other branch of the national economy. They result from the rise in labour productivity, especially in the output of goods, due to the introduction of the latest scientific and technical inventions, the mechanization and automation of industrial processes, the raising of the educational level of the population and the rise in the cultural and technical level of all the workers.

To determine the number of people employed in each branch of the national economy during the planning period, existing trends in the employed-population patterns are analysed. More especially, the rates and qualitative objectives of development are taken into consideration.

Industrial output in the USSR is rising much faster than the increase in the total number of industrial workers, and of engineers and technicians in particular. For example, the gross output of all industry during the years 1940 to 1962 inclusive increased 6.3 times, whereas the average annual number of industrial productive workers increased only 2.2 times, and of engineers and technicians 2.5 times. The increase in production by engineers and technicians actually employed in factories was notably greater than the increase in their number, bearing in mind that the number of persons employed in scientific establishments servicing industry increased during this period more than eight times.

The growth of the gross industrial output for the years 1955 to 1962 remained approximately stable, amounting to a 9 to 12 per cent annual rise, whereas the average number of industrial workers rose by only 2 per cent to 4 per cent per year. The labour productivity of workers in industry increased 3.27 times during the period 1940 to 1962, and for the years 1950 to 1962 it rose on an average by 7 per cent annually. Furthermore, these labour productivity figures do not take into account the reduction in working hours; if the calculation is made per man-hour worked, the increase in productivity is even greater. Thus, in 1960, by comparison with 1959, labour productivity per hour in industry rose by more than 10 per cent. Higher productivity of labour will continue to be the main source of progress in industrial output.

In analysing these trends and in setting the corresponding norms for the years to come it must be borne in mind that the rates of increase in gross output, average annual number of workers and employees, and labour productivity differ according to industry. If this pattern varies, the rates have to be correspondingly adjusted. For example, while the aggregate output of all industry in the USSR for the years 1940 to 1962 rose 6.3 times, the gross output of mechanical engineering rose 16 times, the production of the building materials industry 14, the chemical, rubber and asbestos industries 10, while the output of the food industry increased only 2.7 times, that of light industry 3, the fuel industry 3.9, etc. Labour productivity throughout all industry, in terms of gross output per worker, rose in this period 3.27 times, whereas in mechanical engineering it rose 5.75, in chemical, rubber and asbestos productions 5.18, in light industry 2.17, in the woodworking industry 2.18. It is noteworthy that the productivity of labour rose more in those branches of industry where there was a higher proportion or a larger number of specialists. The highest ratio of specialists to the total number of workers and employees is to be found at present in such USSR industries as electric and thermal power production (15.8 per cent), oil-refining and processing (14 per cent), petro-chemical and chemical industry (12.3 per cent), electrical power engineering (13.8 per cent), the manufacture of instruments (12.7 per cent). It was in these industrial branches that in recent years the greatest rise in labour productivity in terms of gross per capita output also was achieved.

Of course, the increase in labour productivity in industry, as well as in agriculture and other forms of material production, is achieved through improvements in any direction. They include technical labour equipment and the adoption of advanced engineering and technological inventions, the comprehensive mechanization and automation of industrial processes, further improvements in the organization of production and labour and the elimination of losses of working time and by still other measures. Nevertheless, in analysing the interdependent factors in industrial activity, special stress should be laid on the following fact. The increased cultural and technical level of the workers and the relatively higher proportion of specialists in the total number of workers and employees, are among the most important elements in achieving a further rise in the productivity. This is an indication of the great economic effectiveness of the expansion and improvement of public education, including higher and secondary specialized education.

The number of productive workers employed in industry, as well as in other branches, fluctuates in direct proportion to the gross output and in inverse proportion to labour productivity. The interrelationship between the average annual number of industrial personnel in a planning year and in a base year may be expressed by the following formula:

Formula 2

$$L_p = L_b \cdot \frac{Co_1 \cdot Co_2 \cdot Co_3 \ldots Co_n}{Cw_1 \cdot Cw_2 \cdot Cw_3 \ldots Cw_n}$$

where:

L_p = Number of workers and employees in the year concerned

L_b = Number of workers and employees in the base year

Co = Coefficient of increase in gross output for each year covered by the plan

Cw = Coefficient of the growth of labour productivity in terms of output per worker in each year covered by the plan

n = Number of years covered by the plan.

If it is assumed that total output and labour productivity will increase uniformly in each of the years covered by the plan, the formula then becomes:

$$L_p = L_b \cdot \frac{Co^n}{Cw^n}$$

Where data of the increase in labour productivity per man-hour worked are available, the coefficient of the increase in terms of output per worker must be proportionally weighted to take into account the proposed reduction of the working day or week.

To illustrate the accuracy of long-term estimates based on formula 2 for determining the expected number of workers and employees in various branches of material production, we may cite the estimates for the end of the fifth and sixth five-year plans, i.e., for the years 1955 and 1960, using 1950 and 1955 as base years.

The directives adopted by the nineteenth congress of the CPSU for the years 1951-55 foresaw an approximately 70 per cent rise in the level of industrial output for this five-year period at roughly a 12 per cent average rate of annual increase and about a 50 per cent rise in the productivity of industrial manpower. In 1950, the average annual number of industrial workers for the whole of the USSR was 14.14 million. Taking into account the estimated increase in gross output and labour productivity, we find, by applying formula 2 that the average annual number of workers and employees in industry in 1955 should have amounted to:

$$L_{1955} = 14.14 \times \frac{1.12^5}{150} = 16.6 \text{ million}$$

In actual fact, the targets set by the fifth five-year plan were over-fulfilled. The gross industrial output rose by 85 per cent and labour productivity by 49 per cent. As a result, the average annual number of workers and employees in the USSR industry in 1955 amounted to 17.37 million. It exceeded the planning estimate by 4.5 per cent.

The directives of the twentieth congress of the CPSU for the years 1956-60 called for a 65 per cent increase in industrial output during the five years and the target for the growth in labour productivity (per man-hour) was set at not less than 50 per cent. The same five-year plan provided for a reduction of the working day of all workers and employees from eight to seven hours. Some workers were by that time already working fewer than seven hours.

An estimate based on formula 2 showed that it would be necessary in 1960 to have as the average annual number of workers and employees:

$$L_{1960} = 17.37 \times \frac{1.65 \times 1.08}{1.50} = 20.6 \text{ million}$$

The coefficient for converting the productivity per man-hour into labour productivity per worker is taken as equal to 1.08 to allow for the above-mentioned reduction of the working day.

The real increase in industrial output in the USSR in the years of the sixth five-year plan was 63 per cent, while labour productivity per worker rose by 37 per cent during the five years. Similarly, the average annual number of industrial workers amounted to 21.09 million in 1960, that is 2.5 per cent more than the number estimated.

The above calculations are approximations. In reality, each branch of industry makes its own estimates on the basis of its development targets. However, the above examples show that, as described further on, it is possible to estimate the probable number of workers needed on a long-term basis by formula 2. A 2.5 to 4.5 per cent deviation is quite acceptable.

Estimates of the number of persons in agriculture, construction, transport and communications are made in exactly the same way - with due allowance for the planned development of these branches in volume of work performed (growth of gross agricultural output, rise in capital investment, increase in the freight turnover of all types of transport, etc.) and for increases in labour productivity and other improvements. The estimate of the number of persons employed in service work takes into account the increase in the volume of work and the norms set for its performance or similar general indices.

The service industries present their own specific problems. For example, a service such as education comprises: (a) educational establishments for the training of skilled workers (higher and secondary specialized training institutes, vocational-technical colleges and schools and FZU schools); (b) general educational schools (primary, seven-year, eight-year and secondary schools, including boarding schools and extended-day-care schools and also schools for young industrial and agricultural workers and schools for adults); (c) pre-school institutions, homes for children, etc., and (d) cultural and educational establishments.

Determining the number of workers and employees in each of the above groups also has its specific features although, with the partial exception of the first group, the calculations for each of them are based on the expected size of the population in the corresponding age groups. The greatest proportion of persons engaged in education is that employed in general educational schools. In order to estimate the probable number of teachers and supervisor-teachers in these schools a study has to be made of the situation at the beginning of the planning period and the various norms, for example, the number of general educational schools, the number of classes and average number of pupils per teacher, the number of study hours per week per classroom. Probable enrolment figures are needed for the number of pupils for each type of school for each year, and for towns and villages. On that basis, a thorough analysis can be made of what changes will occur from year to year in the number of classes, the average number of pupils per class, the teaching load per teacher in hours, and in the curricula. In making these calculations the USSR authorities hope to implement in the course of the next ten years the principle of full compulsory secondary general and polytechnical education for all school-age children and of eight-year schooling for those young persons who are employed in the national economy. In the subsequent decade, universal compulsory complete secondary education is to be provided. The total number of persons employed in education - in this case in general educational schools of all types - is determined by dividing the estimated number of specialists with higher and secondary specialized education in general educational schools by the ratio of specialists to the total number of workers. Table 42 shows the ratio of specialists to the total number of workers and employees engaged in education and the way it has changed over a number of years.

C. DRAFTING THE SUMMARY BALANCE-SHEET OF LABOUR RESOURCES

After estimating the number of people expected to be employed in each branch of the national economy and culture, it is essential to analyse the returns to see that they tally with facts regarding the labour resources available to the State. Obviously, the estimated number of workers and employees in each planning year in all branches of the national economy must correspond to the labour resources available. To this end, as already pointed out, several variants of the labour resources balance-sheet are calculated. This makes it possible to ensure the most rational allocation and utilization of labour resources so as to secure the maximum output with the minimum outlay of labour and thus create conditions for the fullest measure of employment for the able-bodied population.

As a means of evaluating the economic effectiveness of the use made of labour resources, a system of indices is used which makes it possible to evaluate a particular variant, including: (a) the level of labour productivity in material production; (b) the extent to which the able-bodied population is employed in the national economy and in training as students; and (c) the extent to which the population is provided with different types of service.

Section II

OVER-ALL ESTIMATE OF THE ADDITIONAL NUMBER OF WORKERS AND EMPLOYEES NEEDED AND SOURCES OF SUPPLY THEREOF

In order to ascertain the additional manpower needs of state enterprises, organizations and institutions and determine the possible sources of supply, a composite over-all balance-sheet is drawn up. It indicates the most practical sources of manpower for a particular economic region or republic, with due regard to the special features of its development. This is used in planning the size of the enrolment of students in higher and secondary specialized educational establishments, in vocational-technical colleges and secondary schools of general education, and also in fixing the amount of labour to be recruited and of populations to be resettled.

This estimate is made by the provincial (territorial) planning commission, the planning commissions of economic regions and the Gosplan authorities of Union republics for all the enterprises, establishments and organizations situated in the territory concerned, and is shown in the model form in annex II. The USSR ministries and departments work out the allocation for the various republics.

The composite over-all balance-sheet is compiled on the basis of answers from enterprises, and other organizations, and in the light of the over-all estimate of manpower needs of kolkhozes and their sources of supply as well as of the over-all estimate of the number of young persons and qualified skilled workers.

Additional requirements in workers and employees are calculated on the basis of increases in total numbers and replacements. An increase in the total number of workers and employees is defined as the difference between the total number needed in the planning period and the previous year. The estimate of the probable number of persons needed to replace people leaving employment is compiled to show the reasons for manpower losses - normal withdrawal, worker leaving to train as a full-time student or to join the army or because of termination of a labour contract.

Estimates of normal·or natural losses are based on statistical data of the age-composition of workers, with due allowance for the coefficients of mortality and of retirement on pension for reasons of age or ill health. The possible number of persons leaving work for reasons of age or disability is calculated on the basis of returns for the previous two or three years and on the factors affecting the numbers of disabled unemployed and old-age pensioners. The number of workers quitting to train as full-time students is computed on the basis of enrolments in higher and secondary specialized establishments and estimates of how many of these are workers.

The replacement of workers who leave when their labour contracts expire is foreseen for those republics and provinces to which workers are drafted from other republics and territories under the organized labour recruitment system. The number of such workers and employees is calculated from the data supplied by a sample survey made of the enterprises and construction industries to which they were sent under the organized labour draft system or through public appeals.

Additional requirements in workers and employees are obtained from the following sources: (a) entry into industry of skilled workers who are completing their vocational-technical training; (b) entry into industry of young people who, on ending their secondary studies, do not continue training in educational establishments as full-time students; (c) graduates of higher and secondary specialized educational establishments; (d) recruitment of workers and specialists directly by enterprises, establishments and organizations from persons engaged in domestic or private occupations or demobilized from the army, pensioners and others; (e) workers in kolkhozes who have been brought to work in state enterprises, establishments and organizations in areas where kolkhozes have surplus manpower in the planning period; (f) full-time students in higher and secondary specialized educational establishments and persons employed in established posts during a practical industrial training course and also pupils of vocational-technical colleges who work during industrial training.

Proposals for satisfying manpower requirements of the national economy are worked out on the basis of the above estimate. If a particular republic or region has a surplus or a shortage of workers and employees, provision is made for a redeployment of manpower by the system of organized labour recruitment and resettlement of population, and also by drafting graduates of vocational-technical colleges and other educational establishments to work in other areas.

Section III OVER-ALL ESTIMATE OF NUMBER OF YOUNG PEOPLE AND PLANS FOR FINDING THEM EMPLOYMENT

This estimate is made in order to secure the participation of all young people who are not training as full-time students and to discover likely sources for enrolling pupils in educational institutions for specialist training. To anticipate somewhat, it should be mentioned that the over-all estimate of the number of young people is compiled after consideration of the draft plans for preparing skilled workers and specialists. The model form used for this estimate will be found in annex III.

It shows the number of young people completing eight-year and secondary general educational schools, those who, for a variety of reasons, leave before finishing school. It also shows the number of young people who will continue their education as full-time students in secondary general educational schools, in secondary specialized and higher educational establishments and in vocational-technical colleges, and who must be given industrial training and employment in enterprises, establishments and organizations.

This estimate is made for each year of the planning period with separate figures for urban and rural districts for each republic, economic region, province, as well as for individual towns. For greater accuracy within a province the figures are computed to show the composition by sex.

The number of young people who do not continue their studies in secondary general educational schools, but enter the day courses of secondary specialized educational establishments or attend vocational-technical colleges as full-time students, is calculated on the basis of the draft plans for the admission of pupils to such educational institutions.

In order to provide full employment for all young people of a given age, the number of young persons who will be employed in industry is calculated by subtracting from the number of those who are not continuing education in a secondary school, the number who propose to study in other educational establishments.

Separate employment figures show the number of persons who will work in kolkhozes. This is determined in accordance with the over-all estimate of the manpower requirements of kolkhozes and the sources of such supplies.

Besides the above-mentioned categories of young persons, estimates must also take into consideration the need for attracting into vocational training and production activities young persons who have not worked or attended school during the base year. Their number is determined from the most recent estimates that have been made for this group.

On the basis of these calculations a plan is framed for vocational training and employment of young persons which corresponds to the additional manpower requirements of enterprises and organizations.

If some of the young persons, who should be working in industry, cannot find employment in enterprises, establishments and organizations situated in the territory of a particular republic (province, district or town), proposals are drawn up for drafting such young persons for employment in other areas. These proposals are submitted to the higher planning bodies. The number of young persons proposed for drafting is co-ordinated with the relevant sections of the over-all balance-sheet of labour resources and the estimate of additional requirements in workers and employees and sources of supply.

This last estimate is the basis for determining the number to be trained as skilled workers and specialists. The balance of labour resources shows a great, but not decisive influence on the planning of education. The law for the general education of youth controls the planning of secondary education, and the need to guarantee specialists in the national economy influences the planning of higher and secondary specialized education. It must be remembered that only a part of those young people who have completed secondary general education proceed to full-time study in higher and secondary specialized educational institutions.

The influence of the balance of labour resources in the planning of education can be seen in the example of the year 1966, when in the USSR, because the period of education was shortened by one year (from eleven to ten years) in secondary general education schools, there will be a double graduation of students from both tenth and eleventh years while at the same time, the number of graduates from the eighth year will increase in comparison with previous years.

The balance of the utilization of labour resources showed that industry, agriculture, and other branches of the national economy, including national education, could not accept and rationally use the entire double graduation of these young people from secondary school in 1966, without additional measures. Measures necessary for the solution of this problem were drafted, and the Central Committee of the CPSU and the Council of Ministers of the USSR accepted in 1966 the special decree 'Measures for the education and employment in the national economy of young people completing general education in 1966'.

The decree spells out measures designed to increase in 1966 the number of admissions of students with general education to schools of higher level, and to make sure that the young people unable to continue their studies on a full-time basis find early employment after receiving suitable vocational training.

In order to create the conditions for the further extension of education and the professional training of young people completing general education in 1966, the following increases were envisaged, in comparison with 1965; (a) 631,000 graduates from eight-year schools into the ninth year; (b) 124,000 students for full-time education in secondary specialized educational institutions; (c) 34,000 students for full-time study in higher educational institutions; (d) 131,000 students for full-time study in vocational-technical schools.

In accordance with the above decree, technical schools for the training of qualified workers were added to the system of vocational-technical education in major enterprises, in sovkhozes, in construction areas or in other organizations; and the plan foresaw the admission of 96,800 students in 1966. In enterprises as well as in vocational-technical schools, a wide network of short-term six-month courses, and in the most important professions, one-year courses were organized (based on estimates of the needs for personnel in branches of the national economy). These courses, for the training of young people completing secondary education, aim to form qualified workers. The plan foresees a minimum of 40,500 persons trained as worker-builders (fitters and machine operators), 43,000 as workers in trade and general supply, 25,600 in public services. The Ministry of Trade and 'Centrocoyuz' will employ in the system of state trade and consumer co-operative societies, 314,000 students who completed general education, after receiving preliminary professional training in colleges and schools and in courses during work. Finally, not less than 500,000 graduates of secondary schools will be employed in kolkhozes, sovkhozes and other state agricultural enterprises. In the decree, a number of measures forecast a solution in an over-all way for the problem of the prolongation of education and the organization of work for youth completing general education in 1966: the increase of the professional background of workers, the improvement of the organization of teaching productive specializations, the additional payment of scholarships to students in recently organized technical colleges, the material security of youth studying in short-term courses to train qualified workers, the reservation of working places for young people in enterprises and in organizations, the development of production, and the organization of existing enterprises, of departments and sections which will use primarily the labour of young people, etc.

This example shows how our country solves this problem in a practical way. It also shows the important use of labour resources, and the influence the balance of resources has in the planning of education. It bears witness to the anxiety of the Communist Party and the USSR government with regard to the rising generation, to its education and upbringing, and the means that are created to enable young people to use fully their strengths and abilities.

In this way, the planning of the utilization of labour resources and the planning of education are closely linked with one another within the framework of the planned economy of the USSR; their co-ordination solves the most important problem in the economic development of the country on the basis of the most rational and productive utilization of labour resources, the raising of the cultural and technical level of the Soviet people and the provision of full employment for the able-bodied population.

Chapter 2 Planning of secondary general education

Section I THE DEVELOPMENT OF SECONDARY GENERAL EDUCATION

From the first years of the Soviet régime's existence, planning for general secondary education in the USSR constituted a major element in the cultural revolution that made it possible in a short space of time to put an end to illiteracy and to move forward to occupy a leading place in education in the world. Education is one of the most important indications of the cultural development of a society. The extent and present state of schooling in the USSR are illustrated by the following figures.

The number of pupils in all general educational schools rose by 32.8 million or 4.8 times between the school years 1914/15 and 1964/65. In 1964, 4 million students finished the eight-year programme, or 670,000 more than in 1963; 1.4 million finished the ten- and eleven-year programmes or 500,000 more than in 1963. Along with this, 700,000 persons finished secondary schools for young workers and peasants. General secondary education expanded at an especially fast rate in the Union republics where, before the revolution, the people had no written language and were largely illiterate. In Turkmenistan, for example, not one book had been published in the native language. The only newspaper (Transcaspian Review) was published in a mixture of the Farsi and Turkish languages; there were only seven literate persons per 1,000 of the population; only fifty-eight schools were in operation which, in the school year 1914/15, were teaching 7,000 pupils. Ten years after the revolution there were 508 schools in Turkmenistan with 31,900 pupils; after another ten years the number of schools had risen to 1,442 and the number of pupils to 184,200. In the school year 1964/65, 1,590 schools were functioning with 402,000 pupils, fifty-seven times more than the pre-1917 figure.

Still more impressive results have been achieved in developing school education in the Tadzhik SSR where, before the revolution, there were only ten schools with 400 pupils, whereas now there are 2,864 schools in which 457,000 children are being taught, that is, 1,335 times more than before the revolution (table 15).

Before the revolution only an insignificant proportion of the pupils - 1.5 per cent - of a general educational school got into the senior forms.

From the first years of the Soviet régime the number of pupils in secondary education began to rise rapidly and steadily. For instance, in grades 5-11 at present, forty-two times more pupils are being taught than before the revolution; the proportion of pupils in grades 1-4 has decreased from 93.5 per cent to 42.8 per cent and has risen in grades 5-7 from 4.9 per cent to 41.9 per cent of the total number of pupils (table 16).

The rate of change in the network of schools is shown in table 17.

With the introduction of universal primary education a large number of primary schools were opened; in the school year 1927/28 they totalled 91.7 per cent of all schools. At present, with the introduction of universal eight-year schooling, the number of eight-year schools is increasing. In 1964/65, there were 63,900 of them, which represents 33.2 per cent. Nevertheless, primary schools still constitute a large proportion (over half in the 1964/65 school year), because of efforts in rural communities to bring the school as close as possible to the home for younger children. It is not uncommon for primary schools to have a total attendance of only ten to twenty children.

Seven-year and secondary schools, on the other hand, call for a concentration of pupils (specialized teachers, the need for a sound material base, etc.). Furthermore, during school time the pupils of the advanced classes can live in boarding houses attached to the schools and the distance between the place of residence and the school does not play such a decisive role in planning the school network. For this reason seven-year, and more especially secondary, schools are usually large-scale educational establishments.

Schools for young workers and peasants as well as schools for adults (including correspondence courses) have begun to develop more and more widely (table 18). Before the revolution there were no such schools. Today they constitute about

Table 15. Numbers of schools and pupils in general educational establishments of all types, by republic (including schools for young workers and peasants and those for adults) at beginning of school year

Republic	1914/15 (a)	1927/28	1932/33	1937/38	1940/41 (b)	1945/46	1952/53	1960/61	1964/65
Number of schools									
USSR	105 524	118 558	166 275	168 404	198 821	186 853	217 471	224 457	218 384
RSFSR	75 385	80 265	108 677	108 540	116 914	113 453	128 084	129 119	123 007
Ukraine	20 197	20 463	22 632	23 539	32 132	28 470	34 933	37 660	35 405
Byelorussia	4 176	5 536	6 988	7 132	12 294	10 915	12 838	13 063	13 366
Uzbekistan	160	1 933	6 444	4 614	5 448	4 483	6 215	7 686	8 387
Kasakhistan	2 011	3 944	6 869	7 936	7 971	7 909	9 280	10 271	10 408
Georgia	1 765	2 552	4 514	4 428	4 783	4 114	4 599	4 665	4 683
Azerbaidjan	976	1 478	2 907	3 330	4 436	3 258	4 302	4 433	5 378
Lithuania	—	—	—	—	2 865	3 243	3 824	4 257	4 589
Moldavia	220	205	255	245	1 864	1 825	3 097	2 569	2 547
Latvia	—	—	—	—	1 626	1 448	1 688	1 648	1 421
Kirghizia	107	515	1 566	1 794	1 698	1 537	1 904	1 979	2 064
Tadzhikistan	10	336	2 319	4 224	2 789	2 881	2 812	2 935	2 779
Armenia	459	823	1 099	1 180	1 218	1 173	1 357	1 494	1 604
Turkmenistan	58	508	2 005	1 442	1528	1 089	1 327	1 467	1 590
Estonia	—	—	—	—	1 255	1 055	1 211	1 211	1 156

a. Data for 1914/15 academic year according to the frontiers of the USSR on 17 September 1939
b. Including figures for 'rabfaks' (workers' faculties)

[continued on p. 97]

Table 16. Distribution by grade groups of pupils in general-educational schools of all types at beginning of school year (in thousands)

Grades	1914/15	1927/28 (a)	1932/33 (a)	1937/38 (a)	1940/41 (b)	1945/46 (a)	1950/51	1955/56	1960/61	1964/65
Number of pupils	9656	11 369	21 257	29 446	35 552	26 009	34 752	30 070	36 187	46 664
In 1 to 4	9 031	9 910	17 675	20 755	21 483	19 858	20 023	13 682	18 659	19 989
In 5 to 7	473	1 332	3 515	7 677	11 225	5 175	12 776	10 112	12 271	(c) 19 563
In 8 to 11	152	127	67	1 013	2 571	975	1 836	6 159	5 121	(d) 6 867
In other schools (for mentally or physically deficient children)	—	—	—	—	273	—	117	117	136	245

a. Pupils of other schools (auxiliary, for the backward, the blind, deaf and dumb, etc.) not included
b. Including figures for 'rabfaks' (workers' faculties)
c. In classes 5-8
d. In classes 9-11

Table 15
(continued)

Republic	1914/15 (a)	1927/28	1932/33	1937/38	1940/41 (b)	1945/46	1950/51	1955/56	1960/61	1964/65
Number of pupils (c)										
USSR	7 896	11 466	21 397	29 562	35 552	26 094	34 752	30 070	36 187	46 664
RSFSR	5 483	7 468.7	13 219.8	18 843.4	20 633	15 018.3	19 399	16 381	20 398	25 709
Ukraine	1 728	2 448.0	4 555.6	5 501.6	6 830	5 049.4	7 134	5 882	6 722	8 524
Byelorussia	266	484.7	856.5	1 015.8	1 737	1 336.8	1 555	1 290	1 382	1 729
Uzbekistan	17.3	139.8	644.3	931.9	1 315	914.0	1 331	1 350	1 584	2 279
Kasakhistan	105	274.0	576.6	1 022.1	1 158	797.8	1 365	1 344	1 789	2 626
Georgia	157	287.2	510.6	675.2	767	593.1	738	704	703	903
Azerbaidjan	73	171.1	439.4	581.2	695	486.7	660	641	725	1 056
Lithuania	—	—	—	—	380	305.5	430	436	453	532
Moldavia	16.8	21.7	40.9	48.2	440	353.1	481	399	545	738
Latvia	—	—	—	—	242	220.9	295	292	293	342
Kirghizia	7	41.6	145.8	264.9	334	223.4	343	326	398	583
Tadzhikistan	0.4	13.8	124.9	220.9	315	239.8	322	334	393	535
Armenia	35	83.4	179.2	272.5	333	251.7	319	298	338	492
Turkmenistan	7	31.9	103.4	184.2	252	178.0	224	232	279	402
Estonia	—	—	—	—	121	125.2	156	161	185	214

b. Including figures for 'rabfaks' (workers' faculties)
c. In thousands. Including pupils from correspondence-course institutions

Table 17. Number of pupils and number of schools (primary, seven-year, eight-year, secondary schools and others) at beginning of school year (a)

	1914/15	1927/28	1932/33	1937/38	1940/41	1945/46	1952/53	1958/59	1960/61	1964/65
Number of schools (b)	123.7	118.6	166.2	168.4	191.5	186.9	198.3	199.7	199.2	192.3
Of which:										
Primary	119.4	108.8	136.2	122.1	125.9	131.6	115.8	122.4	110.1	97.5
Seven-year	2.0	6.6	26.8	34.2	45.7	41.7	62.0	55.7	36.4	—
Eight-year	—	—	—	—	—	—	—	—	22.5	63.9
Secondary	2.3	1.8	1.3	9.9	18.8	12.8	19.7	30.7	29.2	29.3
Special schools (for children mentally or physically deficient)	—	1.4	2.1	2.2	1.1	0.7	0.8	0.9	1.0	1.6
Number of pupils (c)	9.7	11.5	21.4	29.6	34.8	26.1	30.9	29.6	33.4	42.0
Of which:										
In primary schools	8.6	8.4	12.1	10.9	9.8	9.4	4.5	4.5	4.4	4.0
In seven-year schools	0.3	2.1	7.9	11.2	12.5	9.6	13.6	8.9	6.1	—
In eight-year schools	—	—	—	—	—	—	—	—	5.9	17.5
In secondary schools	0.8	0.9	1.2	7.4	12.2	12.2	12.7	16.1	16.9	20.3
In special schools	—	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.2

a. Excluding schools for young workers and peasants and those for adults
b. In thousands
c. In millions

Table 18. Schools for young workers and peasants and those for adults (including correspondence schools) at beginning of school year

School year	Number of students by grade groups (a)				Total number of schools (b)
	1 to 4	5 to 7	8 to 11	Total	
1945/46	235.8	362.6	115.9	714.5	12 482
1953/54	232.9	903.4	553.9	1 690.2	19 213
1958/59	50.9	606.8	1 258.6	1 916.3	15 493
1960/61	54.2	903	1 812.7	2 769.9	25 229
1964/65	83	1 888 (c)	2 685 (d)	4 656	26 112

a. In thousands
b. Including primary, seven-year, eight-years, and secondary schools in which classes are organized for teaching young workers and peasants
c. In 5 to 8
d. In 9 to 11

12 per cent of all schools and have 10 per cent of the pupils.

Teachers in schools of general education represent one of the most important groups of Soviet intellectuals. They play a decisive role in educating the younger generation and in training them for practical work in the different spheres of socialist construction.

In tsarist Russia, 231,000 teachers were working in schools of all types, the overwhelming majority of them in primary schools, in the school-year 1914/15. In the school-year 1964/65, there were 2,435,000 teachers, or over ten times as many. In 1914/15 there were thirty-four pupils per teacher, in 1964/65, nineteen or almost half as many (see table 19).

The standard of the educational work in a school depends largely on the teacher and on his training. The length of a teacher's training and his level of education constitute important indications of qualifications. At present, the major proportion (76.1 per cent) is made up of teachers who have more than five years' practical experience. In the school-year 1962/63, there were 633,000 teachers of grades 1-4, of whom 91.7 per cent had higher and secondary teacher training and only 0.5 per cent had not completed secondary educa-

Table 19. Schools of the ministries of education and the Ministry of Transport. Teaching staff, according to their education and experience (at the beginning of school-year 1964/65)

Teaching staff (a)	Number in teaching staff (b)	Educational level					Experience	
		Higher education	Teacher-training and other similar institutions	Secondary				
				Complete education	Teacher training	Incomplete education	Up to five years	25 years or more
		%	%	%	%	%	%	%
Heads of primary schools	97	2.9	5.7	83.0	7.8	0.6	12.1	23.1
Directors								
Eight-year schools	64	74.7	21.5	3.1	0.7	—	7.0	20.6
Secondary schools	29	96.7	3.1	0.2	—	—	4.1	26.1
Teacher-training heads								
Eight-year schools	49	70.3	22.4	6.0	1.3	—	11.8	11.6
Secondary schools	59	82.9	8.7	4.4	3.8	0.2	13.4	14.0
Instructors (c)								
In grades 1 to 4	663	5.9	6.3	78.9	8.4	0.5	20.4	13.7
In grades 5 to 8	754	57.5	26.0	10.4	6.0	0.1	25.9	8.6
In grades 9 to 11	231	88.2	8.4	1.8	1.5	0.1	22.1	10.1
Teachers of various subjects (d)	253	15.9	6.9	29.1	33.1	15.0	45.1	4.3
School-year 1964/65	2 199	40.0	14.1	34.9	9.0	2.0	23.9	11.2
School-year 1958/59	1 758	28.9	23.1	41.3	5.1	1.6	21.4	8.1

a. Including school directors. As a rule, the school heads are also instructors in courses
b. In thousands. Excluding those holding another position
c. Except for school directors
d. Music, singing, drawing, mechanical drawing, physical culture and work instruction

Table 20. Teaching staff for grades 5-8 and 9-11, including directors and heads of teaching sections, according to their subjects and level of education (at the beginning of school-year 1964/65)

Subject	Grades 5-8				Grades 9-11			
	Total number of teachers (a)	Educational level			Total number of teachers (a)	Educational level		
		Higher education	Teacher-training and other similar institutions	Secondary (complete and incomplete)		Higher education	Teacher-training and other similar institutions	Secondary (complete and incomplete)
		%	%	%		%	%	%
Russian language and literature	142	62.1	27.0	10.9	34	91.8	6.5	1.7
In schools teaching a non-Russian language	56	54.2	26.3	19.5	16	85.7	11.0	3.3
Native tongue (b)	74	63.4	26.8	9.8	20	89.7	8.7	1.6
History	94	67.5	23.6	8.9	40	92.9	6.0	1.1
Physics	36	64.4	21.8	13.8	31	91.5	6.9	1.6
Mathematics	133	53.4	29.1	17.5	45	90.9	7.5	1.6
Physics and mathematics	59	45.7	36.2	18.1	15	83.9	13.3	2.8
Chemistry	31	70.7	19.2	10.1	27	93.8	5.1	1.1
Geography	59	69.6	19.2	11.2	15	89.3	8.1	2.6
Natural science	70	57.1	25.7	17.2	15	84.3	11.0	4.7
Geography and natural science	25	43.5	37.7	18.4	4	76.6	17.4	6.0
Foreign languages	95	65.8	13.9	20.3	27	87.0	8.1	4.9

a. In thousands. Excluding those holding another position
b. Except for Russian language and literature

tion. These last are for the most part teachers with wide practical experience in teaching. Most teachers of grades 9-11 have received higher education (88.2 per cent), obtained in teacher-training colleges and universities. A small number of the teachers with extensive experience (10.2 per cent) have had only education at the level of a normal school or educational establishment of equivalent status (table 20).

The successes achieved in developing general secondary education for children in the USSR have been gained as the result of the constant daily concern shown by the CPSU and the USSR government.

Section II SYSTEM OF ADMINISTERING SECONDARY GENERAL EDUCATION

According to the constitutions of Union and autonomous republics, the ministry of education is under the authority of the republics which determine what direction education will take. The ministry's activity is controlled by the Council of Ministers of Union and autonomous republics (in the Armenian SSR it is also under the jurisdiction of the ministry of education of the Union republic).

The ministry is responsible for the fulfilment of the main tasks of Soviet schools - the preparation of students for life and for socially useful work. In accordance with this, it is entrusted with: (a) the guaranteeing of compulsory general education and the further development of secondary education whose basis is polytechnical and labour education; (b) the realization of communist education; (c) the development of pre-school education; (d) the care of orphans; (e) the protection of the rights of minors; (f) the strengthening of the material bases of schools and institutions for children, including the supply of teaching plans and programmes; (g) the training of qualified teaching staff; (h) the carrying out of scientific and research work on questions of education and teaching; (i) the organization of the general education of workers through evening and correspondence courses, and other forms of education.

Diagram 1. Relationship of the organs of government administration and the administration of national education

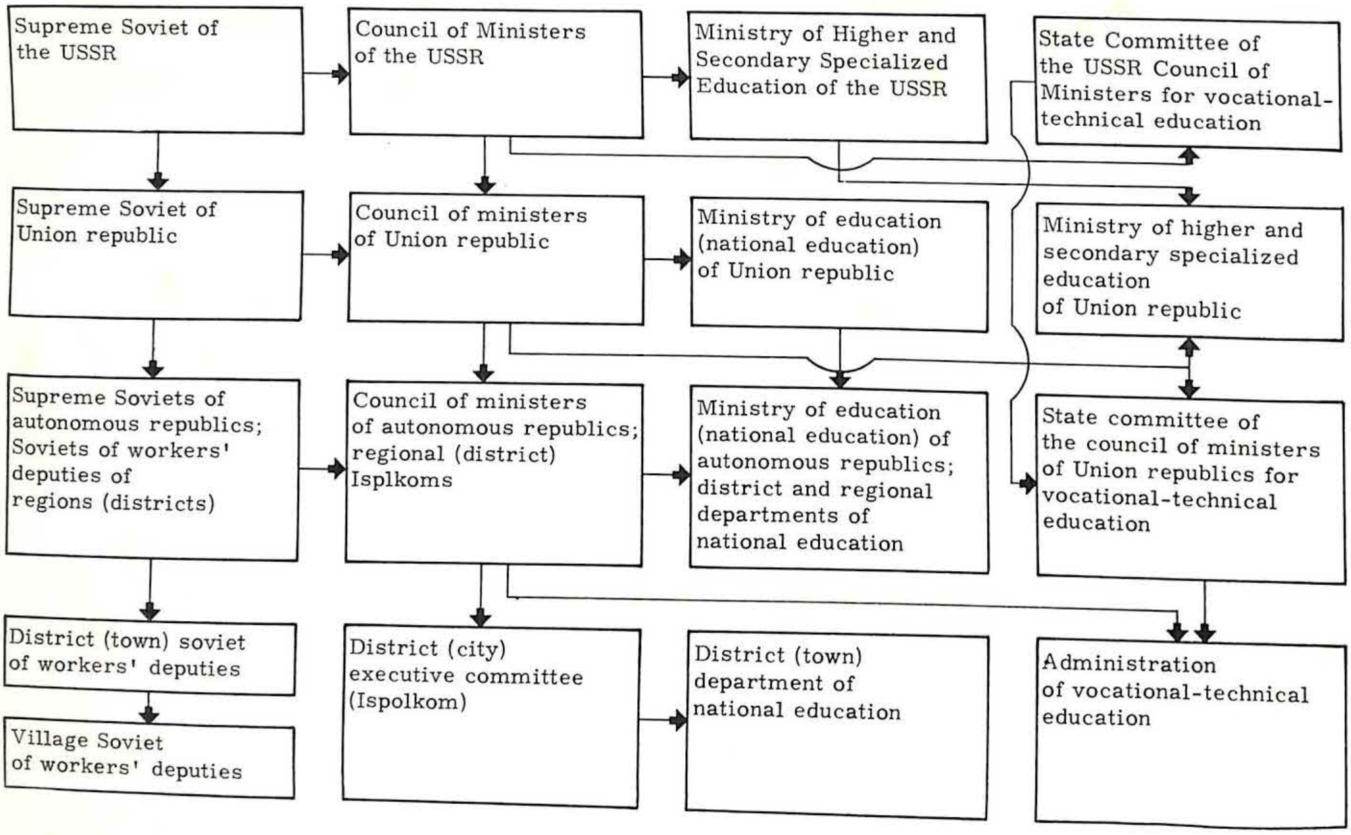
Supreme Soviet of the USSR
Council of Ministers of the USSR
Ministry of Higher and Secondary Specialized Education of the USSR
State Committee of the USSR Council of Ministers for vocational-technical education
Supreme Soviet of Union republic
Council of ministers of Union republic
Ministry of education (national education) of Union republic
Ministry of higher and secondary specialized education of Union republic
Supreme Soviets of autonomous republics; Soviets of workers' deputies of regions (districts)
Council of ministers of autonomous republics; regional (district) Isplkoms
Ministry of education (national education) of autonomous republics; district and regional departments of national education
State committee of the council of ministers of Union republics for vocational-technical education
District (town) soviet of workers' deputies
Village Soviet of workers' deputies
District (city) executive committee (Ispolkom)
District (town) department of national education
Administration of vocational-technical education

Diagram 1 indicates the levels of administration for the various types of educational establishments.

The ministry of education of a Union republic directs the work of the ministries of education of the autonomous republics as well as of the departments of education which are responsible to the executive committees of local soviets. It also directs the work of schools, enterprises, and organizations subordinated to it.

The ministry of education drafts and submits for approval to the Ministry of Higher and Secondary Specialized Education of the USSR, education plans and programmes for teacher-training institutions, draws up plans and programmes for schools, institutes measures to enlarge the material resources of general education schools, and of institutions for children, conceives long-term and annual plans for the system and enrolments in all types of schools, etc.

The main links in the ministry of education's chain of command are the central administration (for example, the central administration of schools, the central administration of higher and secondary pedagogical education institutions) and the more limited administration (for example, the administration of pre-school education, the administration of children's homes).

Working in co-operation with the Ministry of Education in the RSFSR, is the Academy of Pedagogical Science of the RSFSR.[1]

Local organs of the ministry of education are the concern of departments of national education, of executive committees of district, region and area and city soviets of workers' deputies. At the level of the region, district executive committees are divided into city and village branches for education.

Departments of national education check the administration of school, pre-school, and extra-scholastic institutions through an inspection system. Inspectors verify the quality of education-teaching work and the knowledge of students. On the school's recommendation, departments of national education decide whether students will be awarded gold and silver medals. Within their domain is also the preparation and presentation for examination by executive committees of local soviets of projects on improving and developing national education in regions and districts and towns, as well as long-term and annual plans and budgets for national education.

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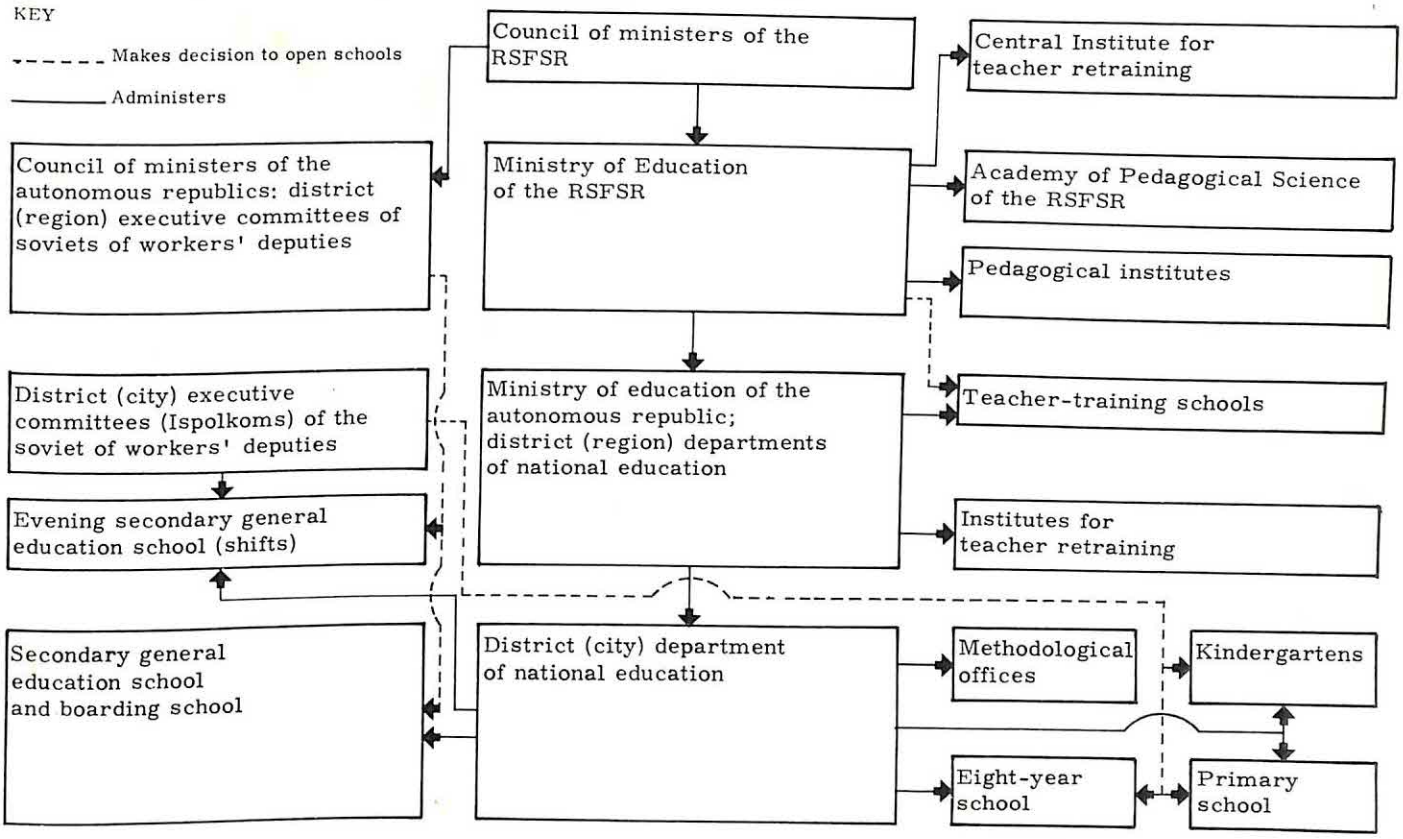
[1] The Academy of Pedagogical Sciences became a part of the federal Ministry of Education in November 1966. The ministry itself was established at that time.

Diagram 2. Administrative organs of national education in the RSFSR


KEY
Makes decision to open schools
Administers
Council of ministers of the RSFSR
Council of ministers of the autonomous republics: district (region) executive committees of soviets of workers' deputies
Ministry of Education of the RSFSR
Central Institute for teacher retraining
Academy of Pedagogical Science of the RSFSR
Pedagogical institutes
District (city) executive committees (Ispolkoms) of the soviet of workers' deputies
Ministry of education of the autonomous republic; district (region) departments of national education
Teacher-training schools
Evening secondary general education school (shifts)
Institutes for teacher retraining
Secondary general education school and boarding school
District (city) department of national education
Methodological offices
Kindergartens
Eight-year school
Primary school

The administration of national education in a republic (RSFSR) and its autonomous republics, regions, districts, etc. is synthesized by diagram 2.

Secondary general educational schools and evening secondary general educational schools are opened by decree of the council of ministers of the autonomous republics and by decrees of the executive committees of the region (district) soviets of workers,' deputies. The financing of these schools comes from the budget of the district (city) department of education.

Primary and eight-year schools are opened by decree of district (city) executive committees of the soviets of workers' deputies with the assent of the ministry of autonomous republics. They are under the jurisdiction of the district (city) department of education and financed from the district (city) budget. Primary schools can also be financed from the budget of village soviets, but the payment of the teaching personnel comes only from the district budget.

Section III DRAFTING OF PLANS FOR THE DEVELOPMENT OF GENERAL SECONDARY EDUCATION

As we have already pointed out, the plan for the development of general secondary education is an integral and inseparable part of the single uniform national economic plan. It is drafted in close co-ordination with other relevant sections, namely, the plans for labour and the balance-sheet or inventory of labour resources, the over-all estimates of the number of young people and the plan for placing them in employment, the plan of capital construction works, the state budget, etc.

Education plans are an essential component of the plans for the development of the national economy of the USSR and the different republics.

The plan for education is drawn up by a whole system of planning bodies, the education ministries of the republics and their local organizations, the USSR Ministry of Transport, the USSR Ministry of Culture, the public health ministries of the republics, the social security ministries of the republics and other ministries having responsibility for educational establishments.

The following are the types of plans that are drawn up for education (taking the RSFSR as an example):

1. Plan for individual establishments (schools, kindergartens, childrens' homes, etc.).
2. Territorial plan for educational development: (a) regional plan for educational development; (b) plan of educational development for provinces, territories, autonomous republics; (c) plan of educational development for Union republics; (d) plan of educational development for the USSR as a whole.

In the composite plan for the development of the local economy and cultural construction of a region, the regional planning commission draws up the following plans for education: (a) plan for the development of the primary school; (b) plan for the development of seven-year and secondary schools; (c) plan for the development of kindergartens, childrens' playgrounds and childrens' homes; (d) plan for the general educational training of adults; (e) capital investment plan; (f) financial plan.

A special feature of the regional plan for education is that the targets for developing seven-year and secondary schools are fixed for each school separately (admissions, withdrawals, size of pupil enrolment, etc.).

When the requirements for teachers and other specialist workers have been determined, the regional or urban departments of public education submit their requests to the provincial or territorial boards of public education.

In the provincial (or territorial) plan for the development of economy and culture, a broader range of sections and objectives is worked out for education. Targets are set for development of the institutions subordinate to the provincial board of public education and provision made for measures of inter-regional importance which will be covered by the provincial (territorial) budget.

The educational plan for a province comprises the following particular sections: (a) development of primary, eight-year and secondary schools; (b) measures for eliminating multi-shift instruction in urban schools; (c) development of sanatorium schools and other special institutions; (d) extra-scholastic institutions; (e) kindergartens; (f) childrens' homes: (g) summer vacations for children and adolescents; (h) general educational training of adults; (i) roster of teachers; (j) supplies; (k) capital construction; (l) finances.

These are drawn up by administrative districts broken down by town or village.

The provincial or territorial planning commission and board of public education draw up educational plans for the territory of a province (territory or autonomous republic). Planning for a school network under the control of a department (e.g., the ministry of transport) is effected by the school board of the railway administration or the provincial (territorial) administrations for schools and extra-scholastic establishments; the provincial (territorial) administrations of autonomous republic or Union republic ministries.

At the level of a republic, the plan is prepared with breakdown by provinces and contains the same sections and objectives as the provincial plan. The USSR Gosplan authorities produce a composite educational plan for the entire country with a territorial breakdown by Union republics and a departmental breakdown by ministries. In these plans great attention is paid to school education. A model form for the plan of development of general educational schools is given in annex IV.

The following schedule is observed: in May the ministry of education of the Union republic asks the department of public education for the current planning details for the year following the model shown in annex IV. On this basis the ministry of education prepares in June a draft which is presented in July to the Gosplan of the Union republic. The Union republic Gosplan incorporates this into the general plan and in August presents it to the council of ministers of the Union republic, which, in turn, submits this plan to the USSR Gosplan and the Council of Ministers of the USSR in October and November. At the December session of the Supreme Soviet of the USSR this plan is approved.

The entire process is based on the law 'on strengthening the ties between school and life and the further development of the public education system in the USSR', adopted in December 1958.

The plan makes provision for the further implementation of universal compulsory eight-year education for children between the ages of 7 and 15-16 and the gradual transition in the years immediately ahead to universal compulsory secondary education for all children of school age.

A. BASIC INDICES OF THE EDUCATIONAL DEVELOPMENT PLAN

1. Determination of enrolments

The basic index heading in the educational plan is 'Enrolment of pupils'. This item reflects the work load of public education establishments and is the basic factor in determining the number of classes and groups of pupils, the development of the school network and the number of trained teachers needed.

The number of pupils in general educational schools, including boarding-schools, schools and groups with extended day-care, is estimated at the start of the school-year separately for each town and village. This is done by grade and groups of grades: comprehensive grades 1-4, grades 5-8, grades 9-10.

The basis is the enrolment at the beginning of the school-year and the number of children of school age.

In planning the number of pupils in grades 1-8, the objective is to educate all children from 7 to 15-16, making allowance for pupils leaving school in the normal course of withdrawals and for possible transfer to schools for young industrial and agricultural workers of adolescents older than 16 (who for age reasons cannot be taught in an eight-year school for children).

The size of pupil enrolments in grades 9-10 is calculated on the basis of admissions to grade 9, leavers from grade 10 and the transfer of some pupils from grades 9-10 during the school year to other educational establishments.

The estimate of pupil enrolments for each year of the planning period is made separately for each town and village on the form shown in annex V.

Admission to the first grades in general educational schools is determined by the number of 7- and 8-year-old children, and older ones who, for some reason, are not receiving school education.

The number of children who will be 7 years old by 1 September of the planning year is ascertained from state statistical returns. The number of pupils in grade 1 is the total of those admitted, those kept back for a second year and those who in the previous school year left grade 1 before the year ended.

The head teachers of primary schools draw up a list of school-leavers and transmit it to the director of the eight-year or secondary school to which the primary school is attached.

For admissions to grade 5, the director of the eight-year school adds to the grade 4 promotion the pupils leaving primary schools in his eight-year schooling region, on the basis of lists received from the head teachers of primary schools.

The composition of the grades following is based on the number of pupils promoted to these grades, plus the pupils kept back for a second year in the grade concerned. Allowance is made for measures to reduce the number of pupils repeating a grade.

For the ninth year, estimates include the figures for pupils who have finished grade 8, but allow for those, who go on to day-secondary specialized educational establishments operating on an eight-year schooling basis and to vocational-technical colleges. Allowance is also made for those adolescents transferred to jobs and to training in schools for young workers and peasants and to secondary correspondence course schools. In the first outline of the plan for the transition to compulsory secondary education in the RSFSR it is envisaged that all children of school age by 1970 will receive complete secondary education in general education schools, in special secondary schools as well as in vocational-technical schools. Those who finish their studies in this school will continue their general secondary education in evening secondary schools.

The micro-regional school keeps an eye on the way village soviets conduct the registration of school-age children and helps them to compile the rolls of children of school age, based on the entries made in household registers; it organizes the admission to schools, etc.

The size of pupil enrolments in a republic, territory, province or region is affected by the measures adopted to re-deploy populations from region to region and also by natural population movements. Accordingly, these factors have to be taken into account when planning, especially in the long term, enrolments of pupils for a republic, territory, province or region.

The national economic plan makes provision for the further expansion of institutions engaged in the social upbringing of school-age children, such as extended day-care schools and groups, boarding-schools (hostels) attached to eight-year and secondary general education schools.

In planning the development of a network of schools and groups with extended day-care, due weight is given to the jobs held by pupils' parents in industry, farming work, on building sites, as well as of the material capacities of schools (lessons given in shifts, availability of rooms for extra-scholastic work and the relevant equipment).

The number of pupils in boarding-schools is determined by the size of the pupil enrolment for the previous year minus leavers, plus the planning-year target figure of admissions to all grades in boarding-schools.

In the plan for schools for young workers and peasants provision is made for increased enrolment for the previous year minus leavers, plus the planning-year targer figure of admissions. The aim is to increase the number of pupils so as to enable all workers, employees and workers on Kolkhozes to receive secondary education. Since some young employed workers have not had eight-year schooling, arrangements are made to admit young workers and peasants to all grades starting from grade 3. In case of need, classes for adults are organized for them.

The number of adolescents to be given an eight-year course of education is determined by the extent to which such young people between 16 and 29 years of age are provided for in evening and correspondence schools. The basic data for determining the above enrolments are found in the census. In the case of persons over 18 years old, steps are taken all over the country to organize classes with accelerated training (equivalent to an eight-year course).

The plan also provides for the education of all children with physical or psychological defects in special schools and boarding-schools (for blind, deaf and dumb, and mentally backward children). Enrolments of pupils in such schools are planned on the basis of statistics of children not receiving education, the number of children being taught in such schools and the number leaving them.

Where there are several nationalities in a region, plans are drawn up for teaching pupils in their native language. If no such plan were available, it would be impossible to provide the schools with specialist staffs of national teachers, publish national textbooks, expand the network of schools, supply staffs for educational establishments, etc.

In multi-national regions the schools may have one or two teaching languages. Two-language teaching may begin with grade 1, grade 5 or grade 8, depending on the national composition of the pupils in the micro-region served by a particular group of school grades.

There are centres of population in which two different national groups are intermingled. In such cases school-teaching in two languages starts with grade 1. A school region may comprise primary schools with teaching languages different from those used in the eight-year school. For instance, an eight-year school may be conducted in Mordvinian while the two primary schools belonging to this school's region are Russian. In this eight-year two-language teaching starts in grade 5.

Schools with single-language teaching draw up enrolment plans in the same way as in regions with single-nationality population. Schools where teaching is given in two languages draw up two plans, one for each nationality and then combine them in an over-all plan for each school.

Enrolment plans for the forthcoming year, after being discussed, amended and co-ordinated with the basic indices of the national economic plan, are drafted and approved in the following manner:

1. The plan is submitted by the teachers' council to the village soviet of workers' deputies for approval and is then transmitted to the regional board of public education.
2. The regional school enrolment plan is placed before a session of the executive committee of the regional soviet of workers' deputies for discussion and approval and is then submitted to the provincial board of public education.
3. The provincial school enrolment plan is considered and approved by the executive committee of the provincial soviet of workers' deputies and sent to the RSFSR Ministry of Education.
4. The RSFSR Ministry of Education submits the school enrolment plan for a particular province for approval by the government of the RSFSR.

After the national economic plan for the forthcoming year has been approved, the planning targets for school enrolments are put into execution, namely: (a) the provincial board of public education, having received the plan from the ministry of education, breaks it down into the respective administrative regions, has it approved in the executive committee of the provincial soviet of workers' deputies and passes it to the rural or urban board of public education; (b) the rural/urban board of public education breaks down the planning targets for enrolments by individual schools, has them approved in the executive committee of the regional soviet of workers' deputies and passes them to schools for execution.

2. Determination of the number of classes and class size

Another important index item is the number of classes and single-teacher classes. It is this figure which is used to calculate the appropriations for upkeep of schools and which determines the quantity of qualified teachers.

The number of classes depends on the total number of pupils and the average for each class. In reckoning the number of classes, account is taken of the present situation and of a possible increase in size of class, due to a rise in enrolments, the bringing into operation of standardized school buildings and the organization of hostels attached to schools. In standardized school buildings classrooms are designed to accommodate forty children. The maximum number of pupils in grades 9-10 is thirty-five. In buildings which have been adapted for school use the number of pupils per grade is determined by reckoning 1.25 square metres of floor area per pupil. If the number of pupils in grades 1-4 is small, they are combined in comprehensive classes. A comprehensive class ('klass-komplekt') is usually a combination of two different classes in which the lessons are conducted by one and the same teacher.

Increasing the number of pupils in classes is one of the important problems in planning public education, as it affords the possibility of making more effective use of the funds or facilities provided for public education. The calculation is based on data showing the average actual size of classes in the period under review, the growth rates over a series of years, population density, the age-composition of the population and all the other factors that tend to increase the number of pupils per class.

The number of single-teacher classes, regular classes and groups is considered in making plans to allot a specific proportion of costs for general educational schools, to arrange their financing and to determine the requirements in classrooms, school buildings and staff.

The plan also contains estimates of the cost of providing pupils with places in schools under the state capital construction scheme of erecting schools with funds derived from kolkhozes and other sources. Provision is made for reducing two-shift teaching by erecting new schools and adding annexes to existing school premises and also by a more logical plan for classroom use.

3. The index 'Graduation of pupils'

This index heading shows the effectiveness of the work done by educational establishments and teachers. By comparing the number of pupils completing school with the initial enrolment, we can establish the number of pupils who have dropped out. A drop-out of pupils (apart from natural losses) and retention for a second year in the same grade mean that the work of the educational establishment is defective.

Figures of promotions, drop-outs, and repeats of a grade cannot be planned, but they indicate the quality of the teachers and of the pupils. They have to be taken into consideration so that action can be devised to improve the education and training performed in schools.

The volume of work devolving on educational establishments is a basic factor in determining their number.

B. PLANNING OF THE SCHOOL NETWORK AND THE CONSTRUCTION OF SCHOOL BUILDINGS

A school network represents the totality of general educational schools in a particular administrative region or town. A school network is based on calculations of the number of pupils and the extent to which school teaching is done in shifts.

The coefficient for the latter is arrived at by dividing the total pupil enrolment by the first-shift pupil enrolment.

A proper school network is the essential condition for a rational organization of scholastic education, for a normal movement of pupils from class to class and grade to grade until the completion of general education.

The way to build up a school network is to organize schools by districts, i.e., to divide administrative regions into school districts for primary education (micro-regions) and others served by eight-year and secondary schools.

Regions where universal secondary education is provided by secondary schools cover a wider territorial area than districts served by eight-year schooling, as they include two or more such schools.

One of the most important tasks of the system of organizing schools by district is to study the economy of the region and its plan for national economic development and to link school locations with the economic plan.

Special attention is directed to improving the distribution of the network of schools in order to reduce the number of thinly attended primary and eight-year schools. Schools of a larger size not only have economic implications but they also help to improve the education work done and to provide schools with staffs of qualified teaching specialists. In the RSFSR in the past three years, 5,700 small schools, including 3,000 primary schools and 2,700 seven- and eight-year schools were merged with others. Yet there are many small schools left. Of the 64,000 primary schools in the RSFSR, 4,000 have less than ten pupils and 8,000 have only ten to fifteen pupils. There are many eight-year schools with not more than 100 pupils. This problem is being solved gradually by building schools of greater capacity, as well as by building village schools in central locations of sovkhozes and kolkhozes with boarding-schools for students living more than three to five kilometres from the school.

The number of school places in a region where an industrial enterprise is situated is determined by the number of workers employed and the surrounding population, with due attention to possible growth as the enterprise gradually expands.

The governing factor in deciding the type of school is the school-age population. The sites of eight-year schools must be selected in relation to the location of populated centres in the region, the distances between them, and also the nationality and age of the children.

The school network is determined by adding up the figures of the network at the beginning of the planning period and those representing the expansion of the network needed. The network of schools is subdivided into primary, eight-year and secondary schools.

In planning a network of schools provision will be made for: (a) maintaining a correct relationship (especially in rural regions) between the numbers of primary, eight-year and secondary schools and the radius of the pupil-population area served by them which should not be more than three to five kilometres; (b) the maximum possible increase in the size of classes; (c) the maximum use of classrooms which still complies fully with technical standards and the requirements of school hygiene.

Construction is financed by the State and by the kolkhozes. School buildings have to comply with strict architectural and pedagogical requirements.

The transition to universal secondary and polytechnical training raises a number of specific problems in erecting school buildings. Further expansion of the network of secondary schools can, for the most part, be effected only by constructing new buildings, since the buildings of seven-year schools cannot be utilized for secondary schools; the premises do not meet secondary school requirements.

The number of school buildings is determined by the planned number of classes. Accordingly, the quantity of secondary school classes must be calculated in the light of changes in the numbers of pupils enrolled, as determined by admissions to grades 1, 5 and 9.

The building of schools is standardized. As a general rule, schools are built of brick, reinforced concrete and large panel blocks. One square metre of usable space costs on an average 65-80 roubles.

A great number of school buildings are built in the USSR. However, the volume of school construction still does not meet the need - some students study in second shifts. The reason is the ineffective use of capital investment allocated for this purpose, and the erection of small capacity schools. There is not sufficient use of prefabricated schools utilizing large panels and frame panel construction.

State funds for school construction can be used more effectively if the average capacity of city schools is increased with the aim of industrializing school construction, cutting costs and the varieties of standard buildings, the state committee for civil construction and architecture for 'Gostroi' USSR worked out three basic types of general education schools for cities: for 960, 1,280 and 1,600 places. For much larger cities, plans were drawn for 2,500 places. Groups of classrooms are frequently added to existing schools. Enlargement and improvement of schools allows for raising the tempo and volume of school construction.

In rural areas, standard eight-year schools were designed for 192, 320 and 480 students and elementary schools with forty to eighty places. Here, the intention is to concentrate in one centre on education, culture and sport. The main link in such a complex can be the school, whose qualified teachers can also organize cultural activities, (library, sport, help in individual artistic activities, culture classes, lectures, etc.). A school-club with a library and a meeting room can be put into one building. Designed by the central scientific research and project institute of school construction together with the Institute for Technical Studies of Rural Equipment, such experimental complexes for sparsely populated villages are decidedly more economical than separate buildings. For centres for 2,000 inhabitants, construction costs are 20 per cent less, while the decrease in land is 25 per cent and the cost of building schools and clubs separately is 15 per cent lower. Such constructions are easy to maintain and can play a major role in the cultural-educational work of the villages.

C. FINANCING OF GENERAL EDUCATION SCHOOLS

An important factor in providing a basis for a public education plan is the securing of financial resources.

As mentioned above, all primary, eight-year and secondary schools which come under the authority of the ministries of education of Union republics are maintained out of the budget funds of soviets of workers' deputies. The general schools of the ministry of transport, which is a Union ministry, are financed out of the Union budget.

Urban schools under the ministries of education are financed from the budget of the relevant city soviet of workers' deputies.

Secondary schools in rural localities are usually maintained out of the regional budget. On the other hand, the costs of all rural primary schools and, as a rule, of rural eight-year schools (except for teachers' salaries) are met from the rural budget. The provision of funds to pay the salaries of teachers in rural schools is covered by regional budgets.

The funds needed to meet a school's requirements are calculated on the basis of estimated expenditures. These calculations and the indices applying to the school's operations on which they are based are combined in one single document titled 'Expenditure Estimates'. After this has been reviewed and approved, the school obtains its funds.

There are two stages in drawing up an estimate or financing plan. First, the composite plan for school financing determines the funds required to maintain all the schools in the particular region, town, province or republic as a whole, without fixing the expenditures of individual schools. This plan is drawn up by the regional and urban boards of public education on the basis of the existing norms of expenditure and the planned pupil-enrolment even before the schools send in their estimates. In the second stage, once the total school expenses are known, a composite plan or estimate is drafted.

In planning the costs of universal education schools and schools for young workers and peasants, a decision is made as to how the network of schools will function in the forthcoming year, how many classes there will be and how many pupils will be in the classes. It is particularly important to make a correct estimate of the number of classes, since the biggest expenses in the plan are those for the salaries of teachers and administrative and service staff. The calculation of the separate types of expenditure on the upkeep of schools follows the model form shown in annex VI.

From 1 January until the beginning of the school-year, funds are provided for the pupil enrolment as it stood on 1 January, and from the beginning of the school-year until 31 December, financial provision is also made for new enrolments foreseen for the planning year. The average annual enrolment of pupils is reckoned as a weighted-average based on the following elements: enrolment of pupils as at 1 January; planned enrolment of pupils at the beginning of the school-year; number of months' financial provision needed for a particular enrolment of pupils in the planning year. For example, if the school-year begins on 1 September, then the enrolment of pupils as at 1 January will require financial provision for eight months and the pupil enrolments as at 1 September for four months. Assuming the number of pupils on 1 January to be 15,200 and on 1 September 16,900, then the average annual enrolment will be equal to

$$\frac{(15\,200 \times 8) + (16\,990 \times 4)}{12} = \frac{189\,560}{12} = 15\,797$$

In order to determine the aggregate of teachers' salaries it will be necessary to obtain the average annual number of the various types of class and also to have data on the pay scale of teachers and the average rates of teachers' salaries.

The salary rate for a teacher of primary grades is based on four hours' teaching daily in school, or on twenty-four hours a week, and for a teacher of senior grades, payment is made for three hours' work daily, or eighteen hours a week.

The next index figure needed for determining the total amount of teachers' salaries is the average rate for teachers in separate groups of grades.

According to a law adopted by the Supreme Soviet of the USSR on 13 July 1964, the average monthly rates of pay for teachers in USSR schools of general education have been fixed as follows: for a teacher with higher education handling grades 1 to 10 in towns and villages and with up to five years' teaching experience, 80 roubles; from five to ten years' experience, 90 roubles; from ten to twenty-five years' experience, 100 roubles; and with more than twenty-five years' experience, 137 roubles.

An additional amount is paid to teachers of Russian, a native or a foreign language, literature and mathematics, in grades 5-10, for correcting pupils' written work. This is fixed at 6 roubles per month with a teaching work load of eighteen hours per week.

Teachers in regions of the Far North, and localities rated similarly, get supplementary allowances on the expiration of the statutory term of service. Teachers of Russian in non-Russian rural primary schools who work less than full-time in the school in question or in schools nearby are paid full rates of salary.

Supervision of class-teaching in seven-year and secondary schools is paid at the rate of 5 roubles more per month, and in the capitals of Union republics and the cities of Leningrad, Kharkov and Kaunas, 7.50 roubles per month.

Appropriations for the salaries of administrative, teaching and service staffs of primary, eight-year and secondary schools are fixed on the basis of the standard establishment lists and salary rates approved by the government.

Scholastic, administrative and other costs for the upkeep of secondary general educational schools are planned on the basis of the statutory norms.

The Soviet State is increasing from year to year the amounts appropriated for education. In 1940, state expenditure on education amounted to 2,300 million roubles; in 1952, 5,900 million; in 1958, 8,600 million; in 1959, 9,400 million; in 1960, 10,300 million; in 1961, 11,300 million; and in 1964, 15,100 million. In other words, it had risen 6.6 times as compared with 1940 and amounted to 16.4 per cent of the USSR state budget.

About 80 per cent of the budget appropriations for education goes to maintaining schools and other educational establishments for children and adolescents and to training specialists for the national economy; the remaining funds are spent on general educational and political-educational work among adults, on the arts, radio broadcasting and the Press.

D. SCHOOL STATISTICS

School statistics play an enormous part in the planning of universal compulsory education. Statistics must: (a) supply authorities regularly with the data required for planning the expansion of school education for the subsequent period (data about school enrolments, the size of the existing schools network, the actual number of teachers, etc.); (b) exercise strict control over the execution of state plans for universal compulsory education.

Current school statistics are kept by departments. The education ministries of the Union republics each have statistical divisions. In the education ministries of the autonomous republics, provincial, territorial and district boards of public education, statistics are provided by the planning and financial divisions which have statistical sections or groups. In the urban and regional boards of public education school, statistics are handled either by special employees or by school inspectors.

The organs of the USSR Central Statistical Administration(CSA)are responsible for performing the following operations in the field of school statistics: co-ordinating at all-Union level materials obtained from departments; conducting censuses and surveys; supervising the organization of basic data collection and accounting in departments; checking the accuracy, completeness and quality of accounts and whether they are backed by proper vouchers; working to improve and simplify the system of data collection and accounting; checking and publishing the results of the execution of the state plans for universal education; analysing statistical material in order to reveal defects in the educational field; and studying experiments in the working of advanced sections; methodological control.

The system of school accounting is based on an initial registration system, through which all the necessary data can be obtained about pupils and teachers. The following forms are used in schools for initial registration: a register of pupils (alphabetical list), pupils' personal files, class journal, list of marks given for lessons and conduct of pupils, register of school employees.

The most important data are submitted by schools once a year - at the beginning or at the end of the scholastic year.

School statistics operate primarily with index figures which coincide, in content and methods of calculation, with the corresponding indices in the plan, since the fulfilment of the plans for universal school education must be checked by the analogous indices for targets. These are, in the main, the absolute, over-all characteristics of the various phases of universal school education. Among them are the indices for the expansion of the school network, the number and composition of school enrolments, the indices of school education broken down by nationality and territory, the indices of the planning and of the size of teaching staffs.

The close connexion between statistics and planning finds expression not only in the content and direction of its methodology and the use of indices but, above all, in the control of the fulfilment of a plan and as a source of initial data for drawing up plans for the period following.

The most important instrument concerning statistics on universal education is the detailed register of children. It shows how many children must be drawn into schooling, how many have actually been receiving education, and how many have not had schooling or have left school.

The use of statistics also permits an evaluation of the quality of planning. For instance, a comparison of the figures for admissions of children to the first grade with the corresponding plan figure may disclose that the plan was 'over-fulfilled' because of an underestimate of pupil migrations, or because of a mistake in calculating the enrolment.

The planned development of secondary general education in the USSR has, in an unbelievably short space of time, abolished illiteracy among the population, has brought about an extremely profound cultural revolution and moved our country into the front ranks of the world as regards the range of educational facilities, the expansion of science and of all branches of culture. The Soviet school of general education has made a great contribution to the cause of the communist education of the labouring masses and the consolidation of communist ideology in our society and in the training of active builders of communism.

Chapter 3

Planning of vocational-technical education

Section I IMPORTANCE OF THE PREPARATION OF SKILLED WORKERS

The development of industry, construction, agriculture and other branches of the national economy goes hand in hand with a continuous rise in the demand for skilled manpower, while technical progress and the absorption into industry of the achievements of science and technology raise the demands made on the level of their qualifications.

To satisfy the ever-increasing requirements in skilled workers in the USSR, a system of vocational-technical education was created in 1940 and has since been widely expanded. The basic purpose is the systematic and organized preparation for all branches of the national economy of culturally and technically educated workers in industry and agriculture with a communist education, ideology, and attitude towards labour.

The extent of the training given to workers for industry, construction and transport in the vocational-technical colleges and schools in the USSR is illustrated by the figures shown in tables 21-24. These demonstrate that in recent years the system of vocational-technical training has been graduating annually up to 900,000 or more skilled workers in different vocations. In addition, vocational-technical schools and also kolkhozes and other agricultural enterprises have been preparing an average of more than 600,000 mechanization specialists annually for agriculture, namely, tractor drivers, tractor mechanics, combine operators, combine mechanics, and assistant combine operators (see table 25).

It should be added that an immense effort is

Table 21. Number of workers graduating from schools and establishments of vocational-technical education from 1941 to 1964 (in thousands)

Schools and establishments	1941-45	1946-50	1951-55	1956-60	1961	1962	1963	1964
Total number of workers trained in schools and establishments of vocational-technical education	2 475	3 392	2 364	3 285	739	888	915	943
Technical institutions	—	—	27	469	119	117	93	—
Railway and mining institutes	685	1 024	719	730	118	147	136	—
Building institutes	—	—	—	126	104	122	116	—
Mechanized-agriculture schools and institutes	—	—	628	1 409	310	372	249	—
Schools for building and industrial-mining	1 790	2 368	990	723	30	23	16	—
Schools for instruction in factory and workshop practice (a)	—	—	—	29	41	45	40	—
Urban and rural vocational-technical institutes	—	—	—	—	5	24	174	828
Evening (shift) vocational-technical institutes and departments	—	—	—	—	12	37	90	115
Drivers trained in vocational-technical schools	—	—	—	52	55	55	54	55

a. Figures indicated here are for schools for instruction in factory and workshop practice which transferred in 1960 to the vocational-technical educational system. These schools remaining in enterprises in 1963, for example, trained 60,000 workers

Table 22. Number of workers graduating from schools and establishments of vocational-technical education in USSR republics, from 1941 to 1964 (in thousands)

	1941-45	1946-50	1951-55	1956-60	1961	1962	1963	1964
RSFSR	1 912.8	2 089.4	1 547.3	2 049.2	462.1	535.9	583.9	605.5
Ukraine	239.2	859.5	484.8	680.8	126.6	155.8	141.1	151.1
Byelorussia	30.8	78.8	64.0	111.6	23.3	24.8	27.5	26.3
Uzbekistan	70.6	39.4	34.8	50.0	16.4	14.4	11.7	17.7
Kazakhstan	102.0	120.0	93.3	198.0	64.0	101.8	95.2	84.7
Georgia	26.7	36.8	23.5	21.8	4.1	5.5	6.0	5.7
Azerbaijan	43.1	45.0	29.7	30.2	5.0	6.4	5.5	5.7
Lithuania	1.8	19.2	14.8	21.4	4.2	4.4	5.4	7.2
Moldavia	2.3	11.6	11.1	21.6	7.3	7.9	9.0	7.6
Latvia	1.5	28.0	18.4	23.7	6.2	6.3	6.7	7.0
Kirghizia	13.9	15.1	7.5	21.3	5.3	6.0	4.8	6.0
Tadzhkistan	4.9	8.7	5.8	15.7	6.6	7.5	5.8	6.8
Armenia	8.9	11.1	7.3	10.3	2.1	3.6	5.6	5.7
Turkmenistan	16.1	11.4	10.0	15.6	2.8	3.9	3.4	3.5
Estonia	0.6	18.2	12.0	13.4	2.9	3.4	3.4	2.7
Total	2 475.2	3 392.2	2 364.3	3 284.6	738 9	887 6	915.0	943.2

Table 23. Number of workers by occupation, graduating from schools and establishments of vocational-technical education in the USSR, from 1952 to 1964 (in thousands)

	1952	1953	1958	1959	1960	1961	1962	1963	1964
Total number of workers trained	326.7	323.7	652.8	582.7	689.0	738.9	887.6	915.0	943.2
Of whom:									
Machinists, mechanics, and their helpers	15.8	18.8	21.8	22.0	23.1	19.2	25.8	33.6	33.2
Metal machine-tool operators (turners, cutters etc.)	29.7	30.2	33.3	30.7	31.0	35.4	41.4	46.8	45.5
Machine tool operators in wood, joiners, carpenters	63.9	60.1	45.9	34.9	34.9	41.8	46.7	45.9	47.2
Electricians and electrical engineers	8.6	8.9	24.6	25.5	23.4	25.4	36.9	38.5	47.8
Fitters and electrical fitters	61.8	63.2	64.8	57.0	59.9	61.4	91.2	104.1	120.7
Blacksmiths	6.3	5.7	4.6	4.0	3.9	3.7	3.4	2.9	3.3
Stonemasons and plasterers	60.0	57.4	80.2	61.1	57.7	63.8	76.9	74.6	74.8
Painters	3.3	2.9	8.2	8.8	9.7	12.1	12.6	13.0	14.3
Tractor- and engine-drivers	—	—	204.2	238.5	304.3	288.0	338.0	312.6	298.2
Combine-mechanics (a)	—	—	58.7	5.5	9.1	9.8	23.1	30.6	23.6

a. The decline in the number of combine-mechanics trained, as compared with 1958, is explained by the organization of training for more broadly qualified workers (tractor- and engine-drivers)

Table 24. Origin of pupils admitted to schools and establishments of vocational-technical education in the USSR from 1940 to 1964 (in thousands)

	1940-45	1946-50	1951-55	1956-60	1961	1962	1963	1964
From towns	1 315	814	801	1 475	361	413	410	435
From rural areas	2 388	2 754	1 583	2 123	545	644	633	654
Total	3 703	3 568	2 384	3 598	906	1 057	1 043	1 089
Boys	2 761	3 218	2 114	3 071	742	876	852	894
Girls	942	350	270	527	164	181	191	195
Total	3 703	3 568	2 384	3 598	906	1 057	1 043	1 089

Table 25. Number of mechanization specialists trained in vocational-technical educational establishments of the USSR, from 1950 to 1964 (in thousands)

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Total number of mechanization specialists trained for agriculture ([a])	513	662	633	598	780	578	510	529	422	478	534	526	657	1 135	921
Of whom:															
Tractor drivers, tractor mechanics	329	390	344	372	372	286	278	352	306	397	449	438	526	821	666
Combine-operators, combine-mechanics	46	73	72	78	91	66	23	69	59	13	18	30	50	105	93
Assistant combine-operators	24	27	21	18	57	31	31	22	11	12	12	4	6	33	6

a. The figures in the table cover the training of mechanization specialists given, not only in vocational-technical educational establishments, but also directly on sovkhozes and other agricultural enterprises, and on kolkhozes. A significant increase in the number of trained machine operators in 1963 is explained by the organization in 1963 of a massive education programme of members of sovkhozes and kolkhozes in mechanized professions

Table 26. Specialist training and improvements of qualifications of workers and employees in USSR from 1940 to 1964 ([a]) (numbers in thousands)

Years	Specialist training		Improvement in specialist qualifications	
	Total ([b])	Workers	Total ([c])	Workers
1940	1 950	1 606	1 665	1 472
1941-45 ([d])	2 672	2 261	2 556	1 851
1946-50 ([d])	2 673	2 261	4 459	3 228
1951-55 ([d])	2 790	2 480	4 907	3 446
1956-60 ([d])	2 783	2 611	5 775	4 473
1961	3 007	2 757	7 210	5 557
1962	3 154	2 875	7 376	5 660
1963	3 467	3 159	7 818	6 019
1964	3 553	3 332	8 784	6 938

a. Data do not include specialist training in kolkhozes. In 1964, the total in kolkhozes of those educated in new occupations and specializations and those who raised their qualifications was greater than one million persons.

Furthermore, up to 1960, about 100,000 workers a year were given specialist training in schools for instruction in factory and workshop practice, and in schools of the same type. In 1960, a part of these schools was included in the vocational-technical educational system. The schools which remained in enterprises in 1964 trained about 66,000 workers

b. Workers and employees who have learned a new occupation or specialization

c. Workers and employees who have received training for purposes of raising their qualifications

d. Yearly average for a five-year period

Table 27. Specialist training and improvements in qualifications of workers and employees in the USSR republics in 1964 (numbers in thousands)

Republic	Specialist training ([a])	Improvement in specialist qualifications ([b])
RSFSR	2 231.4	5 821.6
Ukraine	626.5	1 565.0
Byelorussia	96.1	270.3
Uzbekistan	81.3	176.3
Kazakhstan	234.5	350.9
Georgia	37.6	67.8
Azerbaidjan	30.8	70.2
Lithuania	44.1	76.2
Moldavia	21.9	58.9
Latvia	46.2	101.2
Kirghizia	20.6	45.2
Tadzhkistan	15.7	43.9
Armenia	23.9	50.1
Turkmenistan	10.3	25.7
Estonia	22.9	61.1
Total	3 552.8	8 784.4

a. Total number of workers and employees who have learned a new occupation or specialization

b. Total number of workers and employees who have raised their professional qualifications being made to train workers and employees directly in enterprises, institutions and organizations through individual and group instruction as well as through short-term courses and schools. Enterprises, institutions and organizations endeavour to raise the qualifications of workers and employees by sending them to schools where they are taught advanced labour methods in special courses or technical-industrial courses which improve their skills or teach them others, and which enable them to increase their technical knowledge (see tables 26 and 27).

Tables 21, 25 and 26 show the relative importance of vocational-technical training in schools, farms and on the job. In 1963, for example, for every 100 workers educated in vocational-technical institutions, there were seventy-two mechanics trained in sovkhozes, kolkhozes, and other agricultural enterprises. At the same time 380 workers and employees (of whom 345 were workers) received on-the-job training in enterprises and establishments in other sectors of the national economy either through apprenticeship or group education. In the same year, more than 5 million new workers and employees received some form of training in the USSR, while an even larger number improved their skills or learned new ones.

The value of this for the national economy can be appreciated when it is realized that the 5 million figure is approximately the same as the number of boys and girls reaching maturity in the USSR; in other words, almost every boy and girl beginning a working career has received training in some job skill. This has been made possible by the planning of the economy and the planning of workers' education.

Section II PLANNING OF SKILLED-WORKER TRAINING

The planning of workers' training follows the same principles employed in other sectors of the national economy and culture. It constitutes an integral part of national economic plans and is prepared by the State Committee for vocational-technical education of the Council of Ministers.

A. BASIS FOR PLANNING SKILLED-WORKER TRAINING

The draft programme for skilled-worker training is based on the over-all estimate of additional manpower requirements drawn up by the councils of ministers of the Union republics, USSR ministries and departments. It uses the models prepared by the USSR Gosplan and is closely co-ordinated with the summary balance-sheets of labour resources, the estimates of additional requirements in workers and employees, and the plans for employment of young persons leaving schools of general education, described in chapter 1 of Part Two.

The council of ministers of the republics present their estimates of additional requirements in skilled workers to the USSR Council of Ministers - with a copy to the USSR Gosplan department. This covers all enterprises, building sites, institutions and organizations situated in the territory of a republic, irrespective of which administration controls them. USSR ministries and departments do the same for the enterprises and organizations under their authority, sending relevant details to Union republics and their Gosplan departments. The model used for the over-all estimate of additional requirements in skilled workers and sources of their supply is shown in annex VII.

This estimate serves as the basis for drawing up plans for specialist training in vocational-technical schools and other educational establishments and also directly in industry.

The compilation of the over-all estimates starts with the enterprise. Enterprises, national economic councils and the province as a whole use the list of skills approved by the State Committee for vocational-technical education of the Council of Ministers to the higher planning bodies. But they do not submit this breakdown by skills.

B. CALCULATION OF THE ADDITIONAL NEED OF WORKERS (according to occupation)

Additional requirements in workers, classified by skills, are calculated on anticipated growth and replacements. The growth equals the difference between the number of workers in the planning period and their number in the previous year.

A determination of the number of workers by skills for the planning period derives from data showing the size and composition of stocks of equipment, plans for technical organizational measures, the projected volume of production and productivity of labour and the unit-labour relationship. In order to ascertain the effect of technical improvements, analyses are made periodically of the number of workers by skills (vocational censuses of workers) and of inventories of materials and equipment. Other considerations include the rate of machine replacement of heavy jobs and the introduction of modern industrial equipment. These figures reveal the changes that have occurred in the vocational needs for workers as a result of measures adopted to mechanize and automate industrial processes and improve production technology.

In branches and factories where the total number of workers for the planning period is estimated by skills (chemical, textile, metallurgical, etc.), these data will be used to determine the number of workers needed. In those sectors where the planned figure of workers is estimated without being broken down by skills (mechanical engineering and several others), other methods are used to determine the number of workers by skills.

In such branches, the estimate will be based on a survey of changes that will have to be made in stocks of a particular kind of equipment in order to carry out the amount of production planned.

Assuming the existence of servicing norms fixed for vocational groups, the number of workers by vocations will be computed by the following formula:

Formula 3

$$W_p = E_p \cdot N_p \cdot Cs$$

where:

W_p = Planned number of workers in a given skill

E_p = Planned number of units of the relevant type of equipment (machinery)

N_p = Planned servicing norm (per unit of equipment)

Cs = Coefficient of shift work applying to equipment (machinery) in the planning period

This formula is also used for determing the number of workers in the case of new skills resulting from the introduction of new technology. Further, the servicing norm for new equipment may be obtained either on the basis of the technical design data or of information material supplied by enterprises which already employ this technology.

If servicing norms for a particular skill are lacking, then the number of workers can be computed by the following formula:

Formula 4

$$W_p = \frac{W_a \cdot I_e}{I_o} \cdot I_c$$

where:

W_p = Planned number of workers in a given skill

W_a = Actual number of workers using it

I_e = Index of change in the amount of stock of a particular type of equipment required to execute the amount of production planned

I_c = Index of change in the coefficient of shift work applying to machinery in planning period

I_o = Index of change in the output of workers in given skill in the planning period

The estimate of the planned number of manual workers is computed subject to allowance for changes during the planning period in the volume of work by specific skills and a possible increase in the output of such workers, using the following formula:

Formula 5

$$W_p = \frac{W_a \cdot I_v}{I_o}$$

where:

W_p = Planned number of workers in a given skill

W_a = Actual number of workers in that skill

I_v = Index of change of volume of work to be done by this group in the planning period

I_o = Index of change in output of workers in the given skill

Changes in the volume of labour performed by a manual worker engaged in a basic technological process are determined by noting the increase in output (if there is no mechanization of this type of job). Where manual labour is replaced by machinery, the change in the relationship between the amount of operations by hand and by machinery is measured.

The estimate of additional requirements for skilled agricultural workers is made on the basis of data on the size and make-up of the tractor resources on sovkhozes, goskhozes, and kolkhozes, the servicing norms for the most important types of machinery and the shift-work coefficient of equipment.

In such branches of the national economy as trade, food, housing and communal services, the number of workers in various skills is determined on the basis of establishment schedules or the regulations governing the number of servicing staff. Allowance is made for expansion of the network or an increase in the volume of work done by the enterprises and establishments concerned.

It is essential to know the number of workers in occupations that emerge with new techniques, and the number of skilled workers released by the mechanization and automation of manufacturing processes. These estimates are listed in a separate section according to the form in annex VIII.

The number of workers, skilled or not, who have been released as the result of technological improvements determines the general extent of retraining required (unless these workers can be used in their special fields in other enterprises).

Manpower losses are estimated separately according to the causes: natural losses (due to death, disability or retirement on pension); transfer as full-time students to training in institutes (VUZy) and technicums; call-up for military service; transfer to specialist posts on completing higher and secondary specialized education without leaving employment; transfer to employment in other posts after completing courses and other training in additional skills.

Replacements for natural losses are calculated on the basis of the figures for previous years, adjusted for changes in the age-composition of workers in the planning period and improvements in production and labour conditions.

The numbers needed to replace those leaving to become full-time students are also determined on the basis of the past statistics, with allowance made for changes in the age-composition of workers in the planning period and for expansion of higher and secondary specialized education, both as regards full-time study and training without leaving employment.

The replacement of workers lost as a result of being called up for military service is determined on the basis of figures showing the number of youths of military age, corrected for the average deferments in recent years.

The numbers needed to replace persons who, after graduating from higher and secondary specialized educational establishments without leaving employment, are transferred to specialist posts, are determined by the total number of such persons and the possibility of their promotion.

Additional requirements to make good losses of workers moving into different specializations are affected by the number of persons being taught a new skill in courses for improving qualifications.

These general percentages are then extrapolated to apply to each skill shown on the list.

In the case of newly introduced enterprises, the number of workers is determined by ministries and departments on the basis of their technical characteristics. In view of the fact that large-scale enterprises are brought into operation gradually, the requirements for workers in the various skills are calculated separately each year for each step of the operation so as to ensure the normal working of the installations as they begin to function.

Sources of supply should be able to meet these additional requirements in skilled manpower, without interfering with the training of workers in vocational-technical schools, other educational establishments, and also directly in industry.

Correlation of the types of training given to workers in the various skills is based on the nature and complexity of the jobs, the special features characterizing pupils, the network of vocational-technical schools and its potential expansion. Training in complex work which calls for theoretical knowledge of specialized subjects and a prolonged course of education will, as a rule, be given in vocational-technical schools. At the same time, provision will also be made for training workers in complex vocations directly in industry, by means of courses for improving qualifications.

In determining the possible supply of skilled workers from schools of general education, account is taken only of those pupils who have been given vocational training in the school and who, after leaving school, proceed to jobs in production (in accordance with the over-all estimate of young persons and the plan for placing them in employment).

What is the real contribution of general education schools with polytechnical education in the training of skilled workers, and their role in preparing qualified working forces now and in the years to come?

Since 1959, USSR secondary general education schools have been organized into general secondary education labour polytechnical schools with production training in which persons finishing at the eight-year school receive three years of secondary school education and professional training for work in one of the branches of the national economy or culture. At the same time, secondary schools began professional training for students in grades 9 to 11. The scale of this undertaking by secondary schools is brought out in the following data. In 1959, 622,000 or 22 per cent of the students in grades 9 to 11 received production training. In the years following, the number of these students systematically increased until in 1964 practically all students in grades 9 to 11, more than 4 million, received production training.

Between 1959 and 1964, these schools turned out about 2 million workers and employees for different occupations: metal craftsmen, lathe operators, drivers, cooks, teachers in pre-school institutions, office workers and others, all of which actually help to solve the problem of training youth for work.

However, experience showed that many of these secondary general education labour polytechnical schools could not cope completely with the preparation of qualified technicians essential for industry and other branches of the national economy. They were unable to guarantee students a wide enough choice of the occupations they desired, because they lacked the necessary resources and equipment.

In 1964, a decree from the Central Committee of the CPSU and the Council of Ministers shortened the period of education in secondary general educational schools from eleven to ten years. The last graduation from the eleventh year of secondary schools with vocational training took place in 1966. In the future, the role of secondary general education schools in this kind of training will not be great. Training will continue only in those schools which have proved their competence and which possess a material-technical base. As we pointed out in the first chapter of Part Two, this specialized education will be offered by vocational-technical schools as well as through apprenticeship and group education on the production line.

Workers in the lower skills or in positions not calling for prolonged training are given training directly in industry. This technique is also used for workers displaced by technical progress as well as in evening (or shift) vocational schools, and also in other enterprises, particularly those where they will work later on.

In drawing up estimates of additional skilled manpower requirements for a province, territory, autonomous republic or economic region, planning bodies make use of the information submitted by enterprises. These data follow the form enterprises use but are arranged according to the branches of the national economy and the most important industrial sectors.

This provides figures both for operating enterprises and for those that are about to be introduced. Allowance is made in estimating sources of supply of skilled workers for further expansion of the network of vocational-technical schools in a particular province, territory or republic.

The state planning authorities of Union republics draw up an over-all estimate for each republic, broken down by separate sectors, using as a basis the over-all estimates submitted by ministries and departments and by the provincial and territorial planning commissions. In so doing, they pay special attention to co-ordinating the various sources of supply of skilled workers and the possibility of providing training in vocational-technical schools.

C. THE PLAN FOR SKILLED-WORKER TRAINING

The plan for skilled-worker training in vocational-technical schools is drafted for the provinces, territories and republics on the model form shown in annex IX. The graduation and placement of figures for students of vocational-technical schools are planned by industry and sector of the national economy. Separate forecasts are also made of students' most sought-after skills.

Allowance is made for the over-all requirement estimates of skilled workers. The numbers of pupils admitted are fixed in the light of the additional requirements in skilled workers who can be appropriately trained under this system, of the planned number of student places and the shift-work coefficient of the schools. The quantity of student places is the maximum number who can be trained in a single shift. Promotion, admission and drop-out figures, along with the length of training terms, form the raw materials for estimating graduation statistics.

The extent of the training to be provided in evening (shift) departments and schools is determined principally by the number of workers who need to be retrained or to improve their skills because of technological advances.

In planning the vocational-technical school programmes, the basic factor taken into consideration is how many skilled workers are required by the enterprises, building sites and organizations situated in the particular territory. Furthermore, provision is made where necessary to prepare skilled workers for enterprises and organizations of other Union republics (as a rule, for new enterprises being established in areas which cannot offer training facilities).

The plans for vocational-technical schools are drawn up in co-ordination with the plans for training workers directly in industry and with those for improving workers' qualifications. Account is taken of the over-all youth estimate. It should be borne in mind that all these plans are in terms of persons - while the over-all estimate of additional requirements in skilled workers deals with average annual figures.

The state planning authorities of the republics and the territorial and provincial planning commissions co-ordinate skilled-worker training for all types of jobs and attend to their placement in enterprises, building sites and other organizations, irrespective of what authority administers them.

For co-ordination purposes, the local planning organs draw up a composite estimate of the number of skilled workers needed and sources of supply for all enterprises and organizations in the province, territory or autonomous republic concerned. This is based on estimates by national economic councils, ministries, and departments.

It is divided by sectors of the national economy and branches of industry, with the most important skills shown separately; special attention is also directed to co-ordinating the different types of training, broken down by skills.

With a view to the speediest possible operation of new projects, the planning commissions of provinces, territories and autonomous republics provide for the necessary skilled manpower on the basis of estimates from the relevant organizations or departments. These supply plans show which particular schools and enterprises can prepare specialist workers for new projects in the most important skills.

All the above work is performed under the supervision of the State Committee for vocational-technical education of the Council of Ministers.

Mention should be made at this point of certain special features of the procedure for approving plans for skilled worker training in vocational-technical schools. At present, the plan for the development of the national economy of the USSR approves only the targets for each Union republic in respect to skilled-worker training for the enterprises and organizations of USSR ministries and departments. Targets for the training of workers for enterprises and organizations subordinate to republics are approved in the plan for the development of that particular republic's economy. Thus, each Union republic plans on two levels: the requirements of its subordinate enterprises and organizations for such workers, and also those of enterprises and organizations under Union authority.

The index figures for capital investment in vocational-technical schools are most important. The plan for the development of the national economy of the USSR is concerned with the establishment of vocational-technical schools (expressed in thousands of student places) for each Union republic and USSR ministry and department under whose authority they come, as well as the moneys appropriated for their construction. The inauguration of schools is planned on the basis of the growth in enrolments in the planning year. The state budget makes provision for appropriations for the maintenance of vocational-technical schools.

D. PLANNING INVOLVED IN THE PLACEMENT OF GRADUATES

The placement of graduates of vocational-technical schools is planned on the same lines as their training. The USSR national economic development plan approves for each Union republic the programme for placing young persons who have completed vocational-technical training in positions in state enterprises, institutions and organizations situated in the territory of a Union republic. In addition, it gives approval to the plan for directing skilled workers who have graduated from vocational-technical schools into enterprises and organizations of USSR ministries and departments, indicating to each Union republic how many workers it must assign to the enterprises and institutions of each USSR ministry and department situated in such a republic.

The Union republic's plan, in turn, provides for directing graduates of vocational-technical schools to positions in republic enterprises and institutions and, in compliance with the Union plan, to enterprises and institutions under republic authority situated in its territory. The object is to furnish graduates of vocational-technical schools with employment, so far as possible near their place of residence and training.

The organization in the USSR of a system of vocational-technical training and the planning of skilled-worker training to fit in with requirements for such workers have proved to be one of the most important conditions for successfully solving the major problems of developing industry, construction, agriculture, and other branches of the country's national economy.

Chapter 4

Planning of higher and secondary specialized education

Section I

PLANNING OF SPECIALIST TRAINING: INTEGRAL PART OF THE NATIONAL ECONOMIC DEVELOPMENT PROGRAMME

A. DEVELOPMENT OF HIGHER AND SECONDARY SPECIALIZED EDUCATION IN THE RECOVERY PERIOD

At all stages in socialist construction the Communist Party and the Soviet government have concentrated on the provision of specialists for all branches of the national economy and culture. The growing needs of socialist production and culture called for the systematic extension of specialist training. The high rates of increase in socialist production and in labour productivity, based on technical progress and the introduction of the most recent advances in science and technology, placed ever-increasing demands on secondary specialized and higher education to increase the number of graduate engineers, technicians, agronomists, physicists and other specialists, to improve their theoretical and practical knowledge, and to raise the cultural and technical level of the entire labour force in Soviet society. Plans for the development of secondary specialized and higher education, drawn up in conformity with these requirements, have been intimately related to plans for the development of the national economy of the USSR, and have formed an integral part of these economic plans.

Specialist staffing presented a particularly acute economic problem and a serious political problem in the period between the October Revolution and the first five-year plan (the first ten years of the Soviet régime, from 1917 to 1927). The country had few specialists with higher and secondary qualifications, even fewer than before the revolution, and the overwhelming majority, brought up in the spirit of bourgeois ideology, were accustomed to a privileged position in society. As the dominant class in Soviet society, the working class of our country had to create its own intelligentsia, to raise the cultural levels; otherwise it would have been unable to restore the war-damaged economy and become the true leader of the country.

The task of supplying specialists for the branches of the economy, for cultural activity, and for state employment was therefore approached on three planes during the recovery period:

1. The Communist Party made available from its own ranks a sizeable army of bolshevik organizers (communists and leading non-Party workers) who were educated and trained in the course of practical work.
2. Great efforts were made to win over to the new order the old bourgeois specialists and to use them for socialist construction.
3. A massive programme was launched to prepare proletarian specialists in institutes of higher and secondary specialized education.

In the very early days of the Soviet régime, the Communist Party devised a plan for the socialist reconstruction of the old Russia. Preparing the many highly qualified specialists needed in all branches of the economy and culture was an organic part of this Leninist plan.

In pre-revolutionary Russia (using today's boundaries) there were only 105 institutions of higher education, with a total of only 127,000 students in the 1914/15 academic year. In the whole of Russia, with its vast territory and population, there were only thirteen universities, sixteen institutions of higher technical education with 22,400 students, and eight commercial institutes with 8,000 students. Preparation of specialists for agriculture and for the public health services also existed on an insignificant scale. There was not a single higher education institution for drama students. The social composition of students receiving higher education in pre-revolutionary Russia may be judged from the following information: 38.3 per cent of the students at eight Russian universities in 1914 were the children of landowners and government officials, 43.2 per cent were the children of the clergy and the bourgeoisie, 14 per cent were the children of richer peasants (kulaks), and only 4.5 per cent were the children of workers, peasants and the working intelligentsia. The children of workers and peasants were barred from institutes of higher education by the high fees charged for tuition and the heavy costs incurred during the study period. Only in rare cases did an individual worker or peasant enter an institute of higher education.

In order, therefore, to train future specialists capable of participating in the building of socialism, it was first necessary to ensure an influx of young people from working class and peasant families. By a decree of the Council of People's Commissars of 2 August 1918, which proclaimed the reorganization of higher education on new principles, all restrictions on entry were abolished, not only was tuition in institutions of higher education (VUZy) made free, but provision was also made to give state assistance to students. The decree stipulated that 'the first places must be allocated unconditionally to individuals drawn from the proletariat and the poorest peasantry, who will receive grants on a large scale'.

Workers' faculties (rabfaks) were organized with the same aims in view. These faculties made it possible for adult workers and peasants to take shortened courses of secondary general education and to prepare themselves for entry to institutions of higher education. In 1919, the People's Commissariat for Education decided to set up workers' faculties at universities. The decree on workers' faculties of 17 September 1920, signed by Lenin, set up these faculties at all VUZy with the object of 'involving the masses of the proletariat and the peasantry as widely as possible within the walls of higher education'. The workers' faculties contributed greatly to the formation of a Soviet working-class intelligentsia in the first years of the Soviet régime. In the 1921/22 academic year there were 27,300 students in 87 workers' faculties throughout the country, but in the 1927/28 academic year this had increased to 48,900 students in 122 workers' faculties. Furthermore, 40 per cent of those admitted to VUZy in the 1925/26 academic year had graduated from workers' faculties.

This experience was later used in the reform of higher education in the popular democracies. It should be noted that the workers' faculties also played a large part in the Soviet national republics. The successful organization of many institutions of higher education in the Union and autonomous republics of the USSR would not have been possible without the prior activity of the workers' faculties. Secondary and higher education of students on the job developed from the experience gained in the evening classes of workers' faculties.

The programme of the Russian Communist Party (Bolshevik), adopted at the Party's eighth congress in 1919, played a large part in the reform of higher education. It envisaged 'easier access to higher education for all desirous of studying, and especially for workers; the attraction into teaching jobs in higher education of all those capable of teaching; the elimination of any and every artificial obstacle between new scientific movements and teaching departments; material provision for students so as to make it really possible for workers and peasants to avail themselves of higher education'.[1]

Table 28. Extension of the network of secondary specialized and higher educational institutes, and increase in student enrolments, 1914/15 to 1927/28

Academic year	Higher education Number of institutes	Higher education Number of students (a)	Secondary specialized education Number of institutes	Secondary specialized education Number of students (a)
1914/15 (b)	105	127.4	450	54.3
1922/23	248	216.7	932	121.3
1923/24	187	208.3	903	149.9
1924/25	169	169.5	921	164.6
1925/26	145	167.0	983	181.3
1926/27	148	168.0	1 016	180.6
1927/28	148	168.5	1 037	189.4
Percentage (1927/28 compared with 1914/15)	141%	132%	231%	349%

a. In thousands
b. Present-day boundaries

The efforts of the Communist Party and the Soviet government to expand specialist training during the reconstruction period produced striking results. Table 28 shows the expansion of education and the increased enrolment during this period.

The number of institutes of higher education and their students had increased considerably at the beginning of the reconstruction era, but by the end of that period some of the small institutes with inadequate resources were closed or merged with larger institutes. At the same time the quality of the student enrolment was improved by the removal of inadequately prepared students, and of elements socially alien to the working class.

The number of specialists employed in the national economy rose considerably as a result of the extension of the network of educational institutions. In 1928, there were 521,000 specialists with higher and secondary specialized education employed in the national economy as against 190,000 in 1913, an increase of 2.7 times. This figure included 233,000 individuals with higher education as against 136,000, or 1.7 times more, and 288,000 with secondary specialized education, as against 54,000 or 5.3 times more. In 1927 there were thirteen specialists per 1,000 workers in heavy industry as against seven in 1913.

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[1] CPSU, Resolutions and Decisions of Congresses, Conferences and Plenary Sessions of the Central Committee, 7th ed., Part I, p.420, of the Russian text.

It should be noted here that the scale of the specialist training programme was dictated by the acute need for specialists to restore the war-damaged national economy, and by the financial and educational resources which the country was able to allocate to educational institutions. These institutions were usually under the jurisdiction of the People's Commissariat for Education, and plans for admission of students for each academic year were laid down by this commissariat on the basis of the proposals of the educational institutions and in agreement with them, taking into account the targets fixed for economic and socialist construction, availability of the physical plant and of professorial and other teaching staff, and of financial resources. It must be particularly emphasized that, even at this time, the extension of specialist training was planned in strict conformity with the economic directives of the Communist Party, and with the economic and political problems which the country was trying to solve in the first years of Soviet power. At this time there were no long-term plans being made for specialist training based on estimates of the national economy's needs for such persons.

B. FIRST FIVE-YEAR PLAN FOR SPECIALIST TRAINING

Long-term planning of specialist training in the USSR began in 1927 when the first five-year (1928-32) economic development plan was framed. We shall consider in some detail the methods used in drawing up this plan, in the belief that it will be of particular interest to the reader.

A special decree of the fifteenth congress of the CPSU (bolshevik) in December 1927 'on the directives for the compilation of a five-year national economic plan' laid down the main provisions of a five-year plan for industrializing the country and emphasized that, in relation to the tasks of socialist construction, the five-year plan should take cognizance of the need to improve decisively the cultural level of the urban and rural population, to develop the national cultures of the peoples of the USSR, and to integrate the plan of cultural construction with the industrialization of the country as a part of the general plan of socialist construction in the USSR. It was suggested that the plan of cultural construction should be based on those tasks of education that would ensure the cultural growth of the working masses (universal education, elimination of illiteracy, large-scale vocational training, etc.), and of the preparation of qualified specialists and scientific workers.

Following these directives, the Supreme Economic Council of the USSR made the first calculations, in late 1927, of the industrial requirements in specialists over a five-year period, and determined that an additional 18,400 engineers and 19,000 technicians would be required during this period for the industries with which it was concerned (mainly large-scale industry). The calculations were based on use of the specialist-saturation factor for individual branches of industry and individual enterprises. The saturation factors, i.e., the number of specialists per hundred or thousand workers, were calculated by relating the number of engineers and technicians to the number of workers in existing similar enterprises or in a branch of industry over several earlier years. This factor was then extrapolated for new plants or for enterprises reconstructed in accordance with the plan. The numbers of specialists were established by multiplying the calculated number of workers for the new plants and reconstructed enterprises by the specialist-saturation factor established for similar enterprises or for the branch of industry.

A fundamental drawback of these initial estimates of the requirements in specialists was the fact that the actual level of specialist-saturation in industry was maintained unaltered, although technological progress in industrial development and the experience of other, technically more advanced, countries showed the need for increasing the proportion of specialists, especially in mechanical engineering, where specialist-saturation is higher than in other branches of industry.

As a result of the technical backwardness inherited from pre-revolutionary Russia, and the extremely weak development of mechanical engineering and other more advanced forms of production, the number of specialists employed in Soviet industry was extremely low (approximately sixty-five engineers to 10,000 workers) in comparison with other industrially developed countries. (In Germany, for example, in 1925 there were 210 engineers to 10,000 industrial workers.) This led to understatement of the need for specialists in the original calculations of the Supreme Economic Council of the USSR, and these calculations were not adopted as a basis for the specialist training plan throughout the five-year period.

Work on determining requirements in specialists and on framing a five-year plan for specialist training was continued between 1928 and 1930 by the USSR Gosplan, Supreme Economic Council of the USSR, people's commissariats for education, for agriculture and other commissariats, under the unflagging supervision and with the assistance of the Central Committee of the CPSU (bolshevik), the Central Committee, and the State Economic Council of the USSR. The preparation of new specialists was regarded as one of the most important tasks of the Communist Party and the government. The problem of skilled personnel, and especially of technical staffs, had already become acute in the early years of the first five-year plan in connexion with the switch-over of the country to industrialization, the extensive development of construction in a number of major enterprises in metallurgy and mechanical engineering, power stations, light industry, the food industry, and other branches of industry. The rate of increase in specialist training clearly lagged behind the rate of industrialization of the country. The number of works-trained engineers and technicians employed in enterprises rose sharply, and reached 48 per cent of the total number of engineers and technicians in 1928, as against 39 per cent in 1927.

A special resolution 'on improving the training of new specialists', adopted by the Central Committee of the CPSU (bolshevik) at its plenary meeting in July 1928, stated that, if the level of industrial development of the leading capitalist countries was to be reached, and then surpassed, in a relatively short space of time, the supreme achievements of science and technology would have to be introduced into production in every possible way, and sufficient numbers of appropriately trained technical staff would have to be made available to industry, transport and agriculture. The plenary meeting of the Central Committee noted the acute disparity between the requirements in qualified specialists for an industry in full reconstruction and for the development of capital construction, on the one hand, and the situation as regards the preparation of new specialists in the existing institutions of higher education and technical schools, on the other hand. It proposed that, in conformity with the long-term plan for the development of industry, the economic organs and the organs of the People's Commissariat for Education should double the proportion of engineers and technicians in large-scale industry by the end of the five-year period, and thereafter satisfy the major requirements of industry in the following five-year period. The resolution made it mandatory to start in 1928 on the organization of technical schools of a new type specially intended for skills which were in short supply, and to expand student enrolments and the network of technical schools so that the ratio of engineers to technicians should not be less than 2:3 by the end of the five-year period. The resolution also outlined a number of measures to improve the work of higher educational institutes and technical schools, reinforce their links with production, improve their staffing situation, etc.

As a result of the extensive and painstaking work carried out by the USSR Gosplan and the Supreme Economic Council of the USSR, in conjunction with all the people's commissariats for branches of the national economy and culture, a five-year plan for specialist training, the first in the history of the USSR, was prepared and submitted to the government in May 1930. The scientific approach made to solving problems concerned with requirements in specialists and with the planning of their training for all sectors of the national economy and culture was a feature of this plan, as was also the detailed way in which it was framed and the wide scope with which it encompassed all branches of the national economy.

Economists from all branches of the economy, specialists from industry, agriculture, banking and financial circles, and scientific research and other organizations, and scholars from institutes of higher and secondary specialized education were involved in working out the plan. All the calculations of requirements in specialists were related to and closely linked with the production indices of the first five-year plan. The plan was based on the five-year forecasts of requirements in skilled personnel, basing their calculations on the proposed technical and organizational changes in production during the five-year plan period, employing the 'normal staffing' method. By this method the requirements in specialists were determined on the basis of a new specially devised staffing schedule for an enterprise, department, and often even for groups of machines and separate complex units typical of a given branch of industry, i.e., a model staffing schedule for each group of enterprises and workshops with similar production indices and a similar technological process. These staffing schedules specified the functions of the specialists for each post, and the knowledge and qualifications that they should possess. What was produced was, in essence, a model classified list of the posts to be filled by specialists with higher and secondary specialized education, which indicated the number of specialists needed to fill each type of post in a model enterprise, workshop, etc. Essentially the same method is being employed even today to determine requirements in specialists in the USSR.

The additional requirement in specialists, that is to say the number of specialists to be trained in the planning period in institutes of higher and secondary specialized education, was defined as the difference between the number of specialists needed under the 'normal staffing' method and those actually available. To this difference was added the number of specialists needed to make good natural wastage. The calculations did not, however, take into consideration additional requirements related to the retraining and partial replacement of works-trained individuals employed in specialist posts.

The 'normal staffing' method was used to calculate requirements for specialists in all branches of production, including industry, agriculture, transport, and communications, etc. Requirements in the non-productive sphere were calculated by a different method. The number of teachers needed for schools of general education, for example, was estimated on the basis of the teaching load per teacher in the secondary school, and on the basis of one teacher per 'class-komplekt' in the primary school. Requirements in teachers for higher and secondary specialized education were also calculated by the number of teaching hours per teacher, based on the number of lessons and the number of students. These principles have retained their practical importance to the present day.

When working out requirements and framing the plan for specialist training in the first five-year plan, it became essential to have a uniform list of specializations as a basis for specialist training and for planning. Such a list was compiled, although it was admittedly not all-embracing and not without its defects. In the industries planned by the Supreme Economic Council this list covered 330 specializations classified in thirteen groups. It also became necessary to give a scientifically based answer to questions concerning the proportion of specialists among the total number of workers, the ratio between posts to be filled by specialists with higher or secondary specialized education and, accordingly, to fix the proportions in which such specialists were to be prepared. This problem was also solved, although the ratio was not precise enough. The plan envisaged that the proportion of engineers and technicians relative to the total number of workers should be doubled throughout industry, and that the ratio between technicians and engineers should be only slightly increased, from 100:145 to 100:160.

Taking an average for industry as a whole, it was planned to increase the number of posts for engineers and technicians from thirty-two per 1,000 workers on 1 October 1929 to sixty-five in 1932/33, increasing the number of posts for specialists with higher education from thirteen to twenty-five, and for those with secondary education from nineteen to forty. A fourfold increase in the number of specialists over the five-year period was envisaged for all branches covered by the plan, with the main expansion in specialist training in electrical engineering, mechanical engineering, chemistry and metallurgy, in accordance with the planned industrialization of the country. Slightly slower rates were envisaged for specialist training in the textile, food, leather and paper industries. The targets for the development of higher and secondary specialized education for each year of the five-year plan were more closely defined when the annual plans were worked out and approved.

The experience gained in framing the first five-year plan of specialist training was of great positive significance for all further work on the planned development of higher and secondary specialized education in the USSR. The main merits of this experience were the following.

1. It was shown in practice that it was a basic requirement and essential condition for planning specialist training that these plans should be closely linked with plans for the development of the country's national economy; the main task of the specialist-training plan being to satisfy the specialist requirements of branches of the national economy and culture.
2. Scientifically based principles for assessing requirements for specialists were formulated; these principles were employed in subsequent planning and have retained their significance down to the present.
3. Specific measures were undertaken to improve the siting of educational institutions in relation to the country's productive forces, as will be shown in greater detail below.
4. The problems which had to be solved if the planning of specialist training was to be improved were revealed, and the first steps towards their solution were taken. These problems included the drafting of a classified list of posts to be filled by specialists; determination of a scientifically based proportion of specialists to workers in each branch of the national economy; selection of the most rational ratio between specialists with higher and secondary specialized education; framing of a uniform list of the specializations taught at higher and secondary specialized educational institutions; introduction of nationally applicable statistical records of students enrolled, and of the physical plan of higher and secondary specialized educational institutions; selection of the optimum percentage for the natural wastage of specialists, drop-out of students, etc.

The main task of the first five-year plan for the development of higher and secondary specialized education was to increase the number of specialists graduating, especially engineers and technicians, and to effect some improvement in the quality of their training. To these ends the periods of instruction were reduced and educational institutions were specialized in relation to specific branches of industry. The average length of tuition was reduced from 4.62 years in the 1927/28 academic year to 3.66 years in the 1930/31 academic year.

Table 29 gives indices of the increased activity of higher and secondary specialized educational institutions during the first five-year plan.

During the five-year plan the enrolment of students in higher education institutes (VUZy) increased 2.8 times and in technicums 3.5 times. The social structure of the student body at VUZy and of pupils at institutes of secondary specialized

Table 29. Increased activity of higher and secondary specialized educational institutions during the first five-year plan

Academic year	Higher education				Secondary specialized education			
	Number of institutes	Number of students (a)	Number of admissions (a)	Number of graduates (a)	Number of institutes	Number of students (a)	Number of admissions (a)	Number of graduates (a)
1928/29	152	176.6	42.8	28.7	1 051	206.3	56.2	28.6
1929/30	190	204.2	56.2	32.5	1 115	237.5	84.7	37.9
1930/31	579	287.9	144.2	43.9	2 955	586.8	358.8	61.4
1931/32	701	405.9	184.9	50.4	3 151	707.3	361.2	84.2
1932/33	832	504.4	245.8	43.2	3 509	723.7	424.0	107.7
Proportion 1932/1928	5.5 times	2.8 times	5.7 times	1.5 times	3.3 times	3.5 times	7.5 times	3.8 times

a. In thousands

education changed substantially; this was a great victory for the new social order. The proportion of workers and peasants in the total number of students rose from 49.3 per cent to 72.1 per cent in institutes of higher education between 1928 and 1932 and from 57.1 per cent to 79.6 per cent in technicums, as can be seen in table 30.

During the first five-year plan, 198,700 specialists with higher education were trained and 319,800 with secondary specialized education. This made a total of 518,500 of whom 76,600 were engineers and 105,400 technicians for industry, construction, transport and communications; 37,000 specialists with higher education and 61,900 with secondary specialized education were for agriculture; 19,900 were economists and lawyers with higher education and 15,700 were economists with secondary qualifications; 39,800 were teachers at secondary schools and workers' faculties and other educational workers with higher education, and 93,900 were teachers with secondary specialized education; 25,400 were doctors, pharmacists, medical workers and physical culture instructors with higher education, while 32,400 had secondary specialized education. This provided a considerable increase in the number of specialists employed in branches of the national economy and culture. Thus, whereas there were 233,000 specialists with higher education and 288,000 with secondary specialized education employed in the national economy in 1928, there numbers had increased in 1933 to 403,000 with higher education, or more than 1.7 times, and to approximately 575,000 with secondary specialized education, or approximately twofold. Admissions to institutes of higher education increased 5.7 times and to technical schools 7.5 times during the first five-year plan which led to a corresponding increase in graduations of specialists during the second five-year plan.

Table 30. Social structure of student body in the VUZy and technicums from 1928 to 1932 (in percentage)

	1928	1930	1931	1932
VUZ				
Workers	25.4	33.7	46.4	58.0
Peasants	23.9	22.1	19.2	14.1
Employees	41.7	37.9	30.0	24.9
Other	9.0	6.3	4.4	3.0
Technicum				
Workers	23.3	28.6	42.6	49.5
Peasants	33.8	37.2	33.6	30.1
Employees	—	—	—	—
Other	42.9	34.8	23.8	20.4

As is evident from table 29 showing the indices of the increased activity of institutes of higher and secondary specialized education during the first five-year plan, the network of educational establishments was significantly extended during these years: the number of institutes of higher education increased 5.5 times, and of institutes of secondary specialized education 3.3 times. It should be noted that considerable importance was already being attached at that time to the problem of the correct location of educational establishments as a most important problem in planning the training of specialists. The distribution of the network of education establishments throughout the country was based on requirements of the basic economic law of socialism, the law of planned, proportional development of the national economy; it was effected in close liaison with the siting of socialist production and was one of the conditions for ensuring the supply of staffs of specialists to branches of the national economy throughout the country, with due consideration for the local and national features of economic areas, and of the Union and autonomous republics.

Table 31. Number of higher and secondary specialized educational establishment and number of students in them in the various Union republics of the USSR

Republics ([a])	Educational establishments E Students S (in thousands)	1914/15 ([b])	1927/28	1933/34	1933/34 in percentage in proportion to 1914/15	1927/28
Higher educational establishments						
USSR	E	105	148	714	680	482
	S	127.4	168.5	458.3	360	272
RSFSR	E	72	90	428	595	476
	S	86.5	114.2	303.2	351	265
Ukraine	E	27	39	173	642	445
	S	35.2	29.1	97.5	277	345
Byelorussia	E	—	4	18	—	450
	S	—	4.6	10.9	—	280
Uzbekistan	E	—	3	27	—	900
	S	—	3.9	10.9	—	280
Kazakhstan	E	—	1	15	—	1 500
	S	—	0.1	3.6	—	3 600
Georgia	E	1	6	17	1 700	384
	S	0.3	10.5	16.5	5 500	157
Azerbaijan	E	—	3	13	—	434
	S	—	4.5	9.6	—	213
Moldavia	E	—	—	3	—	—
	S	—	—	0.5	—	—
Kirghizia	E	—	—	3	—	—
	S	—	—	0.4	—	—
Tadzhkistan	E	—	—	5	—	—
	S	—	—	0.6	—	—
Armenia	E	—	2	7	—	350
	S	—	1.6	3.3	—	206
Turkmenistan	E	—	—	5	—	—
	S	—	—	1.3	—	—
Secondary specialized educational establishments						
USSR	E	450	1 037	2 861	637	276
	S	54.3	189.4	588.9	1 080	311
RSFSR	E	297	672	1 693	572	252
	S	35.4	123.2	371.7	1 050	301
Ukraine	E	88	158	567	645	359
	S	12.5	31.2	127.1	1 020	408
Byelorussia	E	15	30	81	540	270
	S	1.4	5.3	16.8	1 200	317
Uzbekistan	E	1	41	72	7 200	175
	S	0.1	7.1	8.7	8 700	122
Kazakhstan	E	7	24	88	1 260	367
	S	0.3	9.6	10.6	3 540	295
Georgia	E	5	46	171	3 420	372
	S	0.5	7.7	28.7	5 740	373
Azerbaijan	E	3	37	72	2 400	194
	S	0.5	7.4	14.1	2 820	191
Moldavia	E	5	...	2	40	—
	S	0.5	...	0.3	60	—
Kirghizia	E	—	4	14	—	350
	S	—	0.4	1.3	—	325
Tadzhkistan	E	—	3	24	—	800
	S	—	0.3	1.2	—	400
Armenia	E	1	12	43	4 300	358
	S	0.1	1.7	5.6	5 600	329
Turkmenistan	E	—	10	34	—	340
	S	—	1.5	2.8	—	186

[a] Data for Lithuania, Latvia, and Estonia are not given as they became part of the USSR later

[b] Present-day boundaries

Particular care was taken to ensure that specialists should be trained as near as possible to their places of future work, that there should be rational co-operation in the training of specialists between Union republics and economic areas, that specialists from the indigenous population should be trained to ensure their maximum retention in production after their training finished, and to ensure that the cultural level of all the previously backward national Union and autonomous republics should be raised to the level of the most developed areas.

The problem of the correct location of educational establishments was solved by setting up new institutes of higher and secondary specialized education and simultaneously systematizing the existing network of educational establishments, the structure of the faculties, departments and the specializations taught.

The changes made in the network of institutes of higher and secondary specialized education in conformity with these principles are shown in table 31.

This demonstrates that, by the end of the first five-year plan there were eighteen VUZy in Byelorussia, twenty-seven in Uzbekistan, fifteen in Kazakhstan, thirteen in Azerbaidjan, three in Moldavia, three in Kirghizia, five in Tadzhkistan, seven in Armenia, and five in Turkmenistan. There had not been a single institute of higher education in those republics before the revolution, and there had not even been one secondary specialized school in Kirghizia, Tadzhkistan and Turkmenistan.

Many of the institutes of higher education set up at this time subsequently developed into major national VUZy. Among them the following may be mentioned:

1. Technical institutes: Moscow Power Institute, Leningrad Electro-technical Institute, Erevan, Saratov and Irkutsk polytechnical institutes, Rostov Institute of Agricultural Mechanical Engineering, Magnitogorsk Mining and Metallurgical Institute, Siberian Metallurgical Institute, Moscow Institute of Petro-chemical and Gas Industry, Tashkent, Kostroma, Ivanovo and Leningrad textile institutes, Novosibirsk, Dnyepropetrovsk, Rostov and Kharkov institutes of railway transport engineers, Leningrad and Odessa Electrical Engineering Communications institutes, Novosibirsk, Voronezh, Gorki, Dnyepropetrovsk, Kiev and Kuibyshev institutes of constructional engineering.
2. Institutes of higher education in agriculture and forestry: Armenian, Bashkir, Byelotserkovsk, Dagestan, Dnepropetrovsk, Zhitomir, Kazakh, Kirov, Crimean, Orenburg, Stavropol, Tadzhik, Tashkent, Turkmen, Uzbek and Cheboksary agricultural institutes; Azov-Black Sea and Chelyabinsk institutes of agricultural mechanization and electrification; Archangel, Byelorussian, Voronezh and Urals forestry institutes.
3. Economic and legal institutes: Irkutsk, Kazan, Leningrad, Rostov and Tashkent institutes of finance and economics; Byelorussian Institute of National Economy; Kuibyshev Planning Institute; Moscow Institute of Economics and Statistics; Sverdlovsk and Saratov law institutes.
4. Medical institutes: Archangel, Bashkir, Voronezh, Gorki, Dagestan, Ivanovo, Kazan, Kazakh, Crimean, Minsk, Perm, Samarkand, Sverdlovsk, Smolensk, Turkmenistan and Khabarovsk medical institutes.
5. Teacher-training colleges: Archangel, Astrakhan, Blagoveshchensk, Buryat, Bukhara, Vologda, Gomel, Komi, Krasnoyarsk, Leninabad, Mari, Omsk, Orenburg, Sverdlovsk, Tyumen, Udmurt, Fergana and Chuvash teacher-training institutes, and many others.

These, briefly, were the results of the development of higher and secondary specialized education in the USSR during the first five-year plan. They were achieved by the Soviet people under the leadership of the Communist Party and the Soviet government, as a result of the planned management of the economy, and the close interrelationship between plans for the development of education and plans for the development of the national economy.

C. PLANNING OF SPECIALIST TRAINING IN THE LATEST FIVE-YEAR PLANS

Programmes for the development of higher and secondary specialized education became an integral part of the second and subsequent five-year plans, and the methods followed in drawing up educational plans were improved. Although the problems of socialist construction differed in each of the five-year plans, each invariably paid great attention to the training of specialists in terms of both quantity and quality. As it is not possible to give a detailed account of each five-year plan for the development of higher and secondary specialized education, it must suffice to describe the basic measures whose implementation significantly affected the planning of specialist training in the USSR. This is augmented by the basic indices relating to the work of higher and secondary specialized institutes from the start of the second five-year plan to the present day.

A further increase in the training of specialists for industry, agriculture, education, public health and other branches of the economy and social life was made necessary by the completion of the technical reconstruction of the entire national economy (industry, transport and agriculture) during the second five-year plan (1933-37) and the implementation of Lenin's policy of increasing productive forces and cultural development in all the national republics. On this basis the second five-year plan envisaged a 70 per cent increase in the number of specialists in the national economy, including a 60 per cent increase in the number of those with higher education.

The number of specialists with higher education trained during the second five-year plan was 370,000 (92 per cent more than were available at the beginning of the plan), and that of specialists with secondary specialized education was 623,000 (108 per cent more). This was 2.2 times more than during the first five-year plan.

Particular attention was paid to increasing the quality of the training given to specialists. A decision of the Central Executive Committee of the USSR and the Central Committee of the CPSU (bolshevik) of 19 September 1932, on 'curricula and conditions in universities and technicums', noted that the Soviet specialist was expected to have increasingly high qualifications, to have a thorough command of the scientific foundations of present-day technology, and a knowledge of the Soviet economic system and its planning. A revision was proposed in the list of specializations taught in institutes of higher education, technical secondary schools and technicums, with a view to reducing as far as possible the classified specializations, and relating the specialized subjects taught in educational institutions to the long-term plans for the development of the particular branch of the national economy and to the achievements of science and technology. The proposal was designed to give specialists wide general scientific and technical grounding as a basis for complete mastery of his own specialization. These directives became the subject of nation-wide discussion, partly conducted in the Press. By the middle of 1935, the 950 specialized courses that had existed had been reduced to 275 broader specialized courses, teaching plans and curricula were considerably modified to widen the general scientific and technical training of specialists and the proportion of hours devoted to specialization was reduced from 35 per cent to 17. At this time special subjects were allocated 10-15 per cent of teaching time in institutes of higher education in the United States of America, and 10-12 per cent in Germany. The new list of specialized courses, which remained basically unchanged until 1954, greatly improved the planning of specialist training.

The third five-year economic development plan for the USSR (1938-42), adopted at the eighteenth congress of the CPSU envisaged a wide range of measures aimed at bringing about major progress in the historic task of raising the cultural and technical level of the country's working class to the standard required of engineering and technical workers. The plan was to increase the enrolment of students attending institutes of higher education and higher technical schools to 650,000, so that emphasis could be laid in the immediate future on improving the quality of higher education. The targets of the third five-year plan were successfully attained and in the academic year 1940/41 the country possessed 817 institutes of higher education, with 812,000 students, 585,000 of them full-time, as well as 3,773 secondary specialized institutes with 975,000 students. In the first three years of the third five-year plan 328,000 persons from institutes of higher education and 678,000 from secondary specialized institutes were trained and directed into the national economy.

The third five-year plan was interrupted by the Second World War. During the war the physical plant of higher and secondary specialized institutes suffered great material losses. In five years (1941-45) the numbers of specialists trained in institutes of higher and secondary specialized were 302,000 and 540,000 respectively, considerably fewer than during the three years immediately before the war (1938-40). Systematic training of specialized personnel, despite wartime difficulties, was one of the important conditions for the victory of the USSR.

Several years were needed to restore the higher and secondary specialized institutes of education destroyed by the war. In 1940, the institutes had turned out 126,100 students; in 1945, the number was 54,600 - 2.3 times smaller. The technicums produced only half as many graduates in 1945 (118,100 against 236,800). Not until 1947 did the secondary specialized institutes reach the pre-war (1940) level in regard to numbers of specialists graduating and the institutes of higher education reached pre-war level only in 1948.

Because of this and of the heavy toll of specialists taken by the war, the country suffered an acute shortage of specialized personnel during the fourth five-year plan (1946-50), with too few specialists graduating to meet the demands of rapid growth in those years in industry and construction. In 1946-48 alone, about 4,000 state industrial concerns were constructed, restored and put into operation in the USSR. Owing to the shortage of specialists during the fourth five-year plan, particularly in power engineering, mechanical engineering, construction and other specializations, the national economy in 1950 possessed only eighty-nine engineers for every 10,000 industrial and office workers, against ninety-three in 1940. Nevertheless, despite physical plant difficulties and teacher shortages during the first post-war five-year plan (1946-50), institutes of higher education trained 652,000 students, 20 per cent more than during the last five years before the war and specialized secondary institutes turned out 1,278,000 or 30 per cent more.

The fifth five-year plan (1951-55) envisaged a further rise in all branches of the national economy and a growth in the material prosperity, health and cultural level of the nation. With the specific aim of further developing the national economy and cultural construction, the plan envisaged roughly a 30-35 per cent increase in the graduation of all kinds of specialists from higher and secondary specialized institutes during the five years and approximately a double increase in the number of specialists graduating from institutes of higher education into the most important branches of industry, building and agriculture in 1955 by comparison with the number in 1950. To meet the requirements for teachers of the growing network of schools, it was planned to increase admissions to teacher-training schools by 45 per cent; provision was made for a 230 per cent increase in admissions to the teacher-training schools of the Lithuanian SSR, a 90 per cent increase in the case of the Lativan SSR and a 60 per cent increase in the case of the Estonian SSR, in order to clear off the arrears in secondary general education which those republics had inherited from the bourgeois régime.

In view of the adult population's growing urge to improve its own education, plans were made to expand still further the higher and secondary specialized institutes providing correspondence and evening courses for working people holding full-time jobs.

Steps were also taken to expand science and science-teaching training during the five-year period by admitting roughly twice as many post-graduates to institutes of higher education and scientific-research institutes. It was proposed to improve the scientific work of institutes of higher education and to make fuller use of scientific manpower to solve the most important problems of national economic development, make the fruits of advanced practical experience generally available and ensure wide practical application of scientific discoveries. Scientists were to be given all possible assistance in working out theoretical problems in all branches of knowledge and strengthening the link between science and production.

The fifth five-year plan was highly successful in achieving its targets for developing higher and secondary specialized education. The five-year target had been to increase the graduation of specialists of all kinds from the secondary specialized and higher educational institutes by 30-35 per cent; in fact, the over-all increase was 39 per cent, the increase from institutes of higher education 72 per cent (1,121,000 against 652,000 in the fourth five-year plan) and from technicums 22 per cent (1,560,000 against 1,278,000 in the fourth five-year plan).

The chief goals which the Communist Party and the Soviet people set during the sixth five-year economic development plan were the further powerful growth of all branches of the national economy on the basis of priority for heavy industry, uninterrupted technical progress and higher labour productivity, a steep rise in agricultural production and, on this basis, a considerable improvement in the material prosperity and cultural level of the Soviet people.

Proceeding from these main premises, the directives for the sixth five-year plan (1956-60), adopted at the twentieth congress of the CPSU (25 February 1956), envisaged specialist training in higher and secondary specialized institutes to meet the demands of the national economy and cultural construction. The total number of specialists graduating from higher and secondary specialized institutes was to be increased in the five years by approximately 50 per cent, and the number of those trained for branches of heavy industry, building, transport and agriculture was to be roughly doubled in comparison with the fifth five-year plan. In fact, during the 1956-60 period, 4,074,000 specialists received higher and secondary specialized education, against 2,681,000 in 1951-55, an increase of 52 per cent. This figure includes 1,479,300 who received higher education against 1,121,000, an increase of 33 per cent, and 2,576,700 who received secondary specialized education, against 1,560,000, an increase of 65 per cent.

During the sixth five-year plan, higher and secondary specialized correspondence and evening school education were greatly expanded so as to train those employed in practical engineering and technical jobs, as well as workers and collective farmers, without taking them away from productive work. The number of students attending evening institutes or taking such correspondence courses without interrupting their employment rose from 720,000 in 1955 to 1,240,000 in 1960, an increase of 72 per cent. This figure includes an almost threefold increase (from 80,900 to 244,900) in enrolments at evening institutes and a 97 per cent increase (from 490,600 to 968,700) in the numbers taking courses at secondary specialized institutes while in full-time employment. Steps were also taken to expand specialist training in institutes of higher education in the Urals, Siberia, the Far East and Kazakhstan, in order more fully to satisfy the growing demands of those regions for specialists.

In the scheduled USSR national economic development figures for 1959-65 adopted by the extraordinary twenty-first congress of the CPSU, provision was made for further expanding and improving training at higher and secondary specialized establishments to meet the requirements of national economic and cultural development. For the period 1959-65, it was planned to graduate 2,300,000 specialists from institutes of higher education against 1,700,000 in 1952-58 (a 40 per cent increase); this allowed for a 90 per cent increase in the number of engineers for industry, building, transport and communications and a 50 per cent increase of agricultural experts as compared with the previous seven years. The biggest increase of engineers was envisaged for fields like chemical technology, automation, computer technology, radio-electronics and other new branches of technology. In the preparation of specialists with higher education, the contribution and importance of evening and correspondence course institutes were to be immeasurably increased. In secondary specialized institutes, admissions in 1959-65 were planned to be 4 million, including students employed in full-time positions.

In accordance with the above-mentioned targets for the past five years of the seven-year plan, the number of students enrolled at institutes of higher education in the USSR had increased from 456,000 in 1958 to 820,000 in 1964, a 76 per cent improvement. This figure includes a 93 per cent increase, from 240,000 to 464,000 in the numbers of those taking courses without leaving employment. In secondary specialized institutes, admissions increased by 584,000 in 1958 to 1,039,000 in 1964, a 78 per cent rise, including a 130 per cent rise (from 220,000 to 506,000) in the numbers of those taking courses without leaving full-time employment. In the period 1959-64 the numbers of specialists graduating with higher and secondary specialized qualifications were respectively 2,009,000 and 2,962,000. These figures show that the seven-year plan targets for the development of higher and secondary specialized education in the USSR will not only be fulfilled, but even overfulfilled.

Basic indices for higher and secondary specialized institutes over the years from the second five-year plan to the present are given in table 32 (on pages 128-9). Detailed statistics concerning admissions and graduates of higher and secondary specialized establishments, as well as the total number of establishments themselves, are shown respectively in tables 33 to 38 (on pages 130-2).

Examination of the figures relating to higher and secondary specialized institutes during the years of the Soviet régime calls for further comment. The main expansion in the network of teaching institutes occurred during the first five-year plan. In the years following, student enrolment was enlarged mainly by consolidating and expanding the physical plant of existing institutes of higher and secondary specialized education and by establishing branches, evening departments and correspondence course sections, particularly at places of work (industrial enterprises and state farms). This also entailed combining certain teaching institutes and, in a number of areas where growth of the economically productive population was high (mainly in the eastern part of the country), establishing new institutes. The process of organizing higher and secondary specialized institutes and reorganizing certain existing institutes is continuing in the USSR, though on a relatively small scale. In 1963, for example, eight new institutes of higher education were opened: Turkmenistan Polytechnical Institute, Dzhambul Light Industry and Foodstuffs Technological Institute, West Kazakhstan Agricultural Institute, Alma-Ata Institute of National Economy, Kirov Polytechnical Correspondence Course Institute, Tyumen Medical Institute, Pavlodar Pedagogical Institute, and two factory higher technical institutes. Several institutes of higher technical education were merged. The very names of the above-mentioned new institutes opened in 1963 show that they were established in the eastern parts of the country - Kazakhstan, Turkmenistan and Siberia - in other words, in areas of intensive industrial and agricultural growth.

A result of implementing Marxist-Leninist nationality policies, all the Union republics have made considerable progress in developing higher and secondary specialized education. This is strikingly clear from the number of students in institutes of higher and secondary specialized education per 10,000 inhabitants throughout the USSR as a whole and the Union republics (tables 39 and 40, pages 133-4). In the academic year 1963/64, there were 144 and 132 students per 10,000 inhabitants in higher and secondary specialized institutes respectively - more than in any other country in the world. All the Union republics have far outstripped the western European countries in the number of students (per 10,000 inhabitants) attending institutes of higher education; Georgia, RSFSR, Uzbekistan, Estonia and Armenia are even ahead of the United States of America in this respect.

In Kazakhstan, Uzbekistan, Kirghizia, Tadzhikistan and Turkmenistan, where there was not a single institute of higher education before the October Revolution and not even one technicum in Kirghizia, Tadzhikistan or Turkmenistan, there were 229,000 students in the academic year 1960/61 and 181,000 attending institutes of secondary specialized education. On average, these republics had 92 students per 10,000 of population, compared with only 41 in France, 35 in Italy, and 34 in the Federal Republic of Germany. In other words, the republics of Soviet Central Asia have almost three

Table 32. Basic indices of the increased activity of higher and secondary specialized educational establishments and the number of specialists employed in the USSR national economy, from 1914 to 1964

Years	Number of establishments	Number of students (a)	Admissions (a)	Graduates (a)	Number of specialists (b)
Higher educational establishments					
1914	105	127.4	—	12.2	(c) 136
1928	152	176.6	42.8	28.7	233
1932	832	504.4	245.8	43.2	(d) 403
1937	683	547.2	158.3	104.8	—
1937, in percentage, in proportion to 1932	82%	109%	64%	242%	—
1938	708	602.9	204.6	103.8	—
1939	750	619.9	188.7	98.3	—
1940	817	811.7	263.4	126.1	(e) 909
1940, in percentage, in proportion to 1937	120%	148%	166%	120%	—
1945	789	730.2	285.7	54.6	(f) 897
1945, in percentage, in proportion to 1940	97%	90%	108%	43%	99%
1946	805	871.7	327.2	76.0	—
1947	807	963.6	281.1	98.5	—
1948	823	1 032.1	291.8	138.0	—
1949	864	1 132.1	324.3	162.6	—
1950	880	1 247.4	349.1	176.9	(g) 1 443
1950, in percentage, in proportion to 1945	112%	171%	122%	324%	161%
1951	887	1 356.1	374.4	201.4	(g) 1 576
1952	827	1 441.5	387.3	219.2	(g) 1 724
1953	818	1 562.0	430.8	220.2	(g) 1 848
1954	798	1 730.5	469.0	234.8	(h) 2 009
1955	765	1 867.0	461.4	245.8	(g) 2 184
1955, in percentage, in proportion to 1950	87%	150%	132%	139%	151%
1956	767	2 001.0	458.7	259.9	(i) 2 633
1957	763	2 099.1	438.3	266.5	(i) 2 805
1958	766	2 178.9	455.9	290.8	(j) 3 027
1959	753	2 267.0	511.7	338.0	(i) 3 236
1960	739	2 396.1	593.1	342.1	(i) 3 545
1960, in percentage, in proportion to 1955	97%	128%	129%	139%	162%
1961	731	2 640	666.9	325.5	(i) 3 824
1962	738	2 944	727.5	316.6	(i) 4 050
1963	742	3 260	772.4	311.7	(i) 4 283
1964	754	3 608	820.5	354.0	(k) 4 548
1964, in proportion to 1914	7.2	28.0	—	29.0	33.0
1964, in proportion to 1940	.92	4.4	3.1	2.8	5.0

a. In thousands
b. Specialists with higher education employed in the national economy
c. In 1913
d. In 1933
e. On 1 January 1941
f. On 1 January 1946
g. On 1 July
h. On 1 April
i. On 1 December
j. At the end of year
k. On 15 November

times as many students as France, Italy and the Federal Republic of Germany. In the academic year 1963/64, the number of students at institutes of higher education per 10,000 inhabitants in these Union republics increased still further to 143 in Uzbekistan, 101 in Kirghizia, 101 in Tadzhikistan, 94 in Turkemnistan and 98 in Kazakhstan. In the Central Asian republics and Kazakhstan, as in all the other Union republics, national staffs of specialists have been developed. At the end of 1963, more than 403,000 specialists with higher education and more than 558,000 with secondary specialized education were employed in the national economy of these republics. This was 8.5 and 5.9 times the figure in 1940.

[text continued on p. 135]

Table 32 (cont.)

Years	Number of establishments	Number of students (a)	Admissions (a)	Graduates (a)	Number of specialists (b)
Secondary specialized educational establishments					
1914	450	54.3	—	7.4	(c) 54
1928	1 051	206.3	56.2	28.6	288
1932	3 509	723.7	424.0	107.7	(d) 575
1937	3 496	862.5	368.7	155.9	—
1937, in percentage, in proportion to 1932	100%	119%	87%	143%	—
1938	3 732	951.9	395.0	201.2	—
1939	3 733	945.0	387.2	240.1	—
1940	3 773	974.8	382.9	236.8	(e) 1 492
1940, in percentage, in proportion to 1937	108%	113%	104%	152%	—
1945	3 169	1 007.7	387.6	118.1	—
1945, in percentage, in proportion to 1940	84%	103%	101%	50%	—
1946	3 375	1 174.5	433.8	180.1	—
1947	3 458	1 231.6	423.3	238.0	—
1948	3 526	1 264.0	430.9	277.3	—
1949	3 433	1 309.2	430.0	269.4	—
1950	3 424	1 297.6	426.3	313.7	—
1950, in percentage, in proportion to 1945	108%	129%	110%	265%	—
1951	3 541	1 368.9	458.4	263.2	—
1952	3 604	1 477.4	500.0	280.6	—
1953	3 726	1 645.5	558.0	295	—
1954	3 795	1 838.7	594.8	332.3	(h) 2 629
1955	3 753	1 960.4	587.5	387.8	(g) 2 949
1955, in percentage, in proportion to 1950	109%	151%	138%	124%	—
1956	3 642	2 012.2	594.6	510.1	(i) 3 624
1957	3 498	1 941.1	557.3	504.0	(i) 4 016
1958	3 346	1 875.9	584.1	551.2	(j) 4 449
1959	3 330	1 907.8	656.2	527.9	(i) 4 781
1960	3 328	2 059.5	769.3	483.5	(i) 5 239
1960, in percentage, in proportion to 1955	89%	105%	131%	125%	177%
1961	3 416	2 369.7	871.1	429.5	(i) 5 609
1962	3 521	2 668	905.6	452.2	(i) 5 906
1963	3 626	2 981.4	945.0	510.7	(i) 6 201
1964	3 717	3 326	1 038.7	668.3	(k) 6 702
1964, in proportion to 1914	8.2	61.0	—	75.0	124.0
1964, in proportion to 1940	.98	3.4	2.7	2.3	4.4

a. In thousands
b. Specialists with secondary specialized education employed in the national economy
c. In 1913
d. In 1933
e. On 1 January 1941
f. On 1 January 1946
g. On 1 July
h. On 1 April
i. On 1 December
j. At the end of year
k. On 15 November

Table 33. Admissions, by specialization, to higher educational establishments in the USSR, from 1940 to 1964 (in thousands)

		1940	1945	1950	1955	1960	1963	1964
Total number of admissions (N)	N	263.4	285.7	349.1	461.4	593.1	772.4	820.5
and percentage (P)	P	100	100	100	100	100	100	100
Of which:								
Industry and construction	N	45.4	52.5	74.0	144.8	225.1	287.3	312.6
	P	17.2	18.4	21.2	31.4	38.0	37.2	38.0
Transport and communications	N	8.3	9.5	12.0	29.8	34.1	42.5	44.7
	P	3.2	3.3	3.4	6.4	5.7	5.5	5.5
Agriculture	N	11.9	17.9	28.5	51.1	62.7	86.5	87.4
	P	4.5	6.3	8.2	11.1	10.6	11.2	10.6
Economics and law	N	13.6	20.3	25.5	28.5	43.9	50.2	54.5
	P	5.2	7.1	7.3	6.2	7.4	6.5	6.7
Public health, physical culture and sport	N	23.0	26.7	23.7	32.3	36.8	43.3	45.6
	P	8.7	9.3	6.8	7.0	6.2	5.6	5.6
Education	N	159.0	155.0	182.6	172.0	185.2	255.7	269.2
	P	60.4	54.3	52.3	37.3	31.3	33.1	32.8
Arts and cinema	N	2.2	3.8	2.8	2.9	5.3	6.9	6.5
	P	0.8	1.3	0.8	0.6	0.9	0.9	0.8

Table 34. Admissions by specialization, to secondary specialized educational establishments in the USSR, from 1940 to 1964 (in thousands)

		1940	1945	1950	1955	1960	1963	1964
Total number of admissions (N)	N	382.9	387.9	426.3	587.5	769.3	955	1 038.7
and percentage (P)	P	100	100	100	100	100	100	100
Of which:								
Industry and construction	N	80.2	108.1	142.2	245.5	322.2	385.1	414.9
	P	20.9	28.0	33.4	41.8	41.9	40.4	40.0
Transport and communications	N	22.9	22.0	28.0	28.5	60.8	77.6	86.7
	P	6.0	5.7	6.6	8.3	7.9	8.1	8.3
Agriculture	N	48.1	48.9	59.3	98.2	120.3	151.0	172.6
	P	12.5	12.6	13.9	16.7	15.7	15.8	16.6
Economics and law	N	18.7	35.0	34.8	51.7	92.7	124.3	133.5
	P	4.9	9.0	8.2	8.8	12.0	13.0	12.8
Public health, physical culture and sport	N	85.5	68.8	48.3	81.3	85.5	102.1	113.0
	P	22.3	17.7	11.3	13.8	11.1	10.7	10.9
Education	N	117.3	93.2	105.8	51.7	72.1	94.4	95.5
	P	30.7	24.0	24.8	8.8	9.4	9.9	9.2
Arts and cinema	N	10.2	11.6	7.9	10.6	15.7	20.5	22.4
	P	2.7	3.0	1.8	1.8	2.0	2.1	2.2

Table 35. Number of graduates, by specialization, from higher educational establishments in the USSR, from 1940 to 1964 (in thousands)

		1940	1945	1950	1955	1960	1963	1964
Total number of graduates (N)	N	126.1	54.6	176.9	245.8	342.1	331.7	354.0
and percentage (P)	P	100	100	100	100	100	100	100
Of which:								
Industrial and construction	N	24.2	8.5	30.0	56.4	95.0	104.4	112.3
	P	19.2	15.5	17.0	23.0	27.8	31.6	31.7
Transport and communications	N	5.9	1.6	6.1	9.5	16.1	16.7	15.7
	P	4.7	3.1	3.4	3.8	4.7	5.0	4.5
Agriculture	N	10.3	2.9	12.7	24.1	34.7	31.4	34.1
	P	8.2	5.3	7.2	9.8	10.1	9.7	9.6
Economics and law	N	5.7	2.4	11.4	15.6	24.7	24.8	28.1
	P	4.5	4.4	6.4	6.4	7.2	7.5	7.9
Public health, physical culture and sport	N	17.4	6.6	20.0	16.9	30.0	31.5	31.6
	P	13.8	12.0	11.3	6.8	8.8	9.5	8.9
Education	N	61.6	32.0	94.1	120.8	139.1	119.9	128.8
	P	48.9	58.6	53.2	49.2	40.7	35.8	36.4
Arts and cinema	N	1.0	0.6	2.6	2.5	2.5	3.0	3.4
	P	0.7	1.1	1.5	1.0	0.7	0.9	1.0

Table 36. Number of graduates, by specialization, from secondary specialized educational establishments in the USSR, from 1940 to 1964 (in thousands)

		1940	1945	1950	1955	1960	1963	1964
Total number of graduates (N)	N	236.8	118.1	313.7	387.8	483.5	510.7	558.3
and percentage (P)	P	100	100	100	100	100	100	100
Of which:								
Industry and construction	N	21.7	16.0	85.4	140.8	189.0	202.9	217.3
	P	9.2	13.5	27.2	36.3	39.2	39.6	38.8
Transport and communications	N	8.3	3.5	18.9	23.9	36.6	35.3	40.7
	P	3.5	3.0	6.0	6.2	7.6	6.9	7.3
Agriculture	N	21.5	19.8	48.7	57.8	80.2	64.9	80.2
	P	9.1	16.7	15.5	14.9	16.6	12.7	14.4
Economics and law	N	7.2	8.2	24.9	30.5	56.5	67.9	73.7
	P	3.0	6.9	7.9	7.9	11.7	13.4	13.2
Public health, physical culture and sport	N	90.4	32.5	54.2	56.3	64.2	71.8	75.8
	P	38.2	27.6	17.3	14.5	13.3	14.0	13.6
Education	N	85.7	37.2	76.6	73.6	48.9	58.0	58.5
	P	36.2	31.5	24.5	18.9	10.1	11.3	10.5
Arts and cinema	N	2.0	0.9	5.0	4.9	7.2	10.2	12.1
	P	0.8	0.8	1.6	1.3	1.5	2.1	2.2

Table 37. Number of higher educational establishments and number of students (in thousands), by specialization, in the USSR, from 1914/15 to 1964/65 (at beginning of academic year)

		1914/15	1940/41	1945/46	1950/51	1955/56	1960/61	1963/64	1964/65
Total number of educational establishments (E) and students (S)	E	105	817	789	880	765	739	742	754
	S	127.4	811.7	730.2	1 247.4	1 867.0	2 395.5	3 260.6	3 608
Of which:									
Industry and construction	E	([a])	136	148	147	165	169	177	185
	S		168.4	158.0	272.8	550.6	872.6	1 253.0	1 421.5
Transport and communications	E	([a])	28	28	35	38	37	37	37
	S		36.2	29.3	47.9	99.0	146.7	187.0	209.9
Agriculture	E	14	91	92	94	99	96	96	98
	S	4.6	52.1	49.8	104.1	195.9	246.4	331.7	356.7
Economics and law	E	15	47	44	47	39	51	41	40
	S	11.4	36.3	44.5	89.2	106.7	161.9	214.3	243.9
Public health, physical culture and sport	E		78	80	89	94	98	97	98
	S		109.8	115.6	111.5	158.8	188.9	212.6	223
Education	E	([b])	407	349	417	285	241	248	250
	S		398.6	321.9	607.0	741.6	759.6	1 034.0	1 123
Arts and cinema	E	([b])	30	48	51	45	47	46	46
	S		10.3	11.1	14.9	14.4	19.4	28.0	30

a. At the beginning of 1914/15, for the two specializations, 'Industry' and 'Transport and communications', there were eighteen higher educational establishments and 24,900 students

b. At the beginning of 1914/15, for the two specializations, 'Education' and 'Arts and Cinema', there were fifty-two higher educational establishments and 81,500 students

Table 38. Number of secondary specialized educational establishments and number of students (in thousands) by specialization, in the USSR, from 1940/41 to 1964/65 (at beginning of academic year)

		1940/41	1945/46	1950/51	1955/56	1960/61	1963/64	1964/65
Total number of educational establishments (E) and pupils (P)	E	3 773	3 169	3 424	3 753	3 328	3 626	3 717
	P	974.8	1 007.7	1 297.6	1 960.4	2 059.5	2 918.4	3 326
Of which:								
Industry and construction	E	560	744	855	1 081	1 098	1 185	1 204
	P	187.5	298.1	449.9	843.1	939.5	1 329.7	1 480.9
Transport and communications	E	160	159	180	197	194	208	208
	P	54.4	67.4	88.4	150.3	179.7	254.0	291.6
Agriculture	E	751	539	619	760	690	680	684
	P	114.7	119.0	162.0	337.8	341.3	463.4	524.1
Economics and law	E	198	220	210	200	209	253	268
	P	43.1	80.0	93.4	134.6	214.9	336.9	368.9
Public health, physical culture and sport	E	1 053	626	621	712	511	597	624
	P	204.4	168.5	126.0	215.9	176.6	278.5	308.4
Education	E	842	702	755	625	404	450	468
	P	345.3	250.8	347.5	247.2	159.2	244.4	270
Arts and cinema	E	209	179	184	178	222	253	261
	P	25.4	23.9	30.2	31.5	48.3	74.5	82.1

Table 39. Number of higher educational establishments and number of students in the USSR republics, from 1914/15 to 1963/64 (at beginning of academic year)

Republics		1914/15 (a)	1940/41	1945/46	1950/51	1955/56	1960/61	1963/64
USSR	E	105	817	789	880	765	739	742
	S	127.4	811.7	730.2	1 247.4	1 867.0	2 396.1	3 260
	I	8	41	...	69	93	111	144
RSFSR	E	72	481	456	516	444	430	427
	S	86.5	478.1	456.0	796.7	1 176.1	1 496.1	2 013
	I	9	44	...	78	104	124	161
Ukraine	E	27	173	154	160	134	135	131
	S	35.2	196.8	137.0	201.6	325.9	417.7	576.7
	I	11	49	...	55	80	97	129
Byelorussia	E	—	25	24	29	23	24	25
	S	—	21.5	12.8	31.6	50.5	59.3	86.3
	I	—	24	...	44	63	72	102
Uzbekistan	E	—	30	33	37	36	30	29
	S	—	19.1	21.2	42.2	65.5	101.3	139.2
	I	—	30	...	64	90	117	143
Kazakhstan	E	—	20	24	26	25	28	37
	S	—	10.4	15.1	31.2	49.2	77.1	113.3
	I	—	17	...	41	58	74	98
Georgia	E	1	21	20	19	19	18	18
	S	0.3	28.5	30.3	35.0	38.0	56.3	69.8
	I	1	80	...	97	95	134	158
Azerbaijan	E	—	16	17	20	14	12	12
	S	—	14.6	19.6	28.6	34.7	36.0	53.0
	I	—	46	...	93	102	91	121
Lithuania	E	—	7	10	11	12	12	11
	S	—	6.0	5.7	11.4	22.7	26.7	38.0
	I	—	21	...	47	84	95	131
Moldavia	E	—	6	6	8	7	6	6
	S	—	2.5	3.2	8.7	17.2	19.2	28.8
	I	—	10	...	36	63	63	89
Latvia	E	1	7	8	11	9	10	10
	S	2.1	9.9	6.7	14.2	15.7	21.6	29.2
	I	11	52	...	79	79	101	132
Kirghizia	E	—	6	6	7	9	8	8
	S	—	3.1	3.8	8.6	13.6	17.4	25.1
	I	—	21	...	50	71	78	101
Tadzhkistan	E	—	6	7	8	8	6	7
	S	—	2.3	2.7	7.1	14.4	20.0	23.6
	I	—	15	...	44	80	95	101
Armenia	E	—	9	13	15	12	10	11
	S	—	11.1	10.0	15.1	19.4	20.2	29.1
	I	—	86	...	105	121	107	140
Turkmenistan	E	—	5	6	6	6	4	5
	S	—	3.0	2.3	6.6	12.2	13.1	17.0
	I	—	24	...	52	87	81	94
Estonia	E	4	5	5	7	7	6	6
	S	3.3	4.8	3.8	8.8	11.9	13.5	17.9
	I	35	46	...	88	108	110	142

a. Present-day boundaries
E Number of educational establishments
S Number of students (in thousands)
I Number of students for 10,000 inhabitants (figures rounded to nearest unit)

— Magnitude nil or negligible
... Data not available

Table 40. Number of secondary specialized educational establishments and number of pupils in the USSR republics, from 1914/15 to 1963/64 (at beginning of academic year)

Republics		1914/15 (a)	1940/41	1945/46	1950/51	1955/56	1960/61	1963/64
USSR	E	450	3 773	3 169	3 424	3 753	3 328	3 626
	P	54.3	974.8	1 007.7	1 297.6	1 960.4	2 059.5	2 981.4
	I	3	51	...	72	98	95	132
RSFSR	E	297	2 188	1 881	2 005	2 220	1 961	2 127
	P	35.4	594.0	657.3	810.0	1 201.0	1 260.3	1 841.4
	I	4	55	...	80	106	105	148
Ukraine	E	88	693	532	584	635	595	669
	P	12.5	196.2	164.1	227.7	374.6	398.2	549.0
	I	4	48	...	62	92	92	123
Byelorussia	E	15	128	94	107	123	102	112
	P	1.4	35.0	26.2	41.8	60.2	62.6	94.0
	I	2	39	...	58	75	76	111
Uzbekistan	E	1	98	71	91	100	75	86
	P	0.1	25.1	20.3	40.4	58.1	52.6	79.4
	I	1	39	...	61	79	61	82
Kazakhstan	E	7	118	92	112	134	140	154
	P	0.3	30.3	29.9	41.9	67.4	86.7	127.2
	I	1	51	...	55	79	83	110
Georgia	E	5	192	126	119	105	81	87
	P	0.5	26.1	25.6	23.8	30.2	26.3	33.0
	I	2	74	...	66	75	60	75
Azerbaijan	E	3	91	69	81	79	66	69
	P	0.5	17.4	17.8	20.3	29.3	27.0	43.2
	I	2	54	...	66	86	68	99
Lithuania	E	13	24	37	45	66	76	75
	P	1.5	6.4	8.4	11.5	22.3	32.3	49.4
	I	5	22	...	47	82	115	171
Moldavia	E	5	22	26	36	37	32	34
	P	0.5	4.1	3.5	12.8	18.5	17.2	25.3
	I	2	17	...	52	68	56	78
Latvia	E	11	41	70	66	65	56	54
	P	1.3	9.6	11.8	17.7	25.1	24.7	34.3
	I	7	51	...	98	125	115	155
Kirghizia	E	—	33	25	29	28	27	30
	P	—	6.0	5.8	10.6	13.6	17.2	24.4
	I	—	41	...	62	72	77	98
Tadzhkistan	E	—	30	24	32	33	22	28
	P	—	5.9	7.5	10.8	13.4	11.9	16.4
	I	—	40	...	66	74	57	70
Armenia	E	1	62	51	44	45	38	42
	P	0.1	8.9	9.7	10.3	17.0	14.8	23.1
	I	1	69	...	71	106	78	111
Turkmenistan	E	—	36	25	26	37	23	42
	P	—	7.7	10.1	7.6	13.6	14.8	23.1
	I	—	61	...	60	97	78	111
Estonia	E	4	17	46	47	46	34	34
	P	0.2	2.1	9.7	10.4	16.1	15.4	23.8
	I	2	20	...	104	146	125	189

a. Present-day boundaries
E Number of educational establishments
P Number of pupils (in thousands)
I Number of pupils for 10,000 inhabitants (figures rounded to nearest unit)
— Magnitude nil or negligible
... Data not available

D. NUMBER OF SPECIALISTS IN RELATION TO THE TOTAL NUMBER OF WORKERS IN EACH BRANCH OF THE NATIONAL ECONOMY

The expansion of specialist training in the USSR has been closely linked with plans for the development of all branches of the national economy. Training in certain groups of specializations thus expanded at faster rates in order to meet priorities at different stages in the socialist construction of particular branches of the economy (see table 41).

In 1963, institutes of higher education trained 122,200 future specialists for industry, construction, transport and communications, while secondary specialized education establishments trained 238,000. This represented increases of four times and 7.9 times respectively in relation to 1940. Graduates in these fields were 23.9 per cent and 12.7 respectively of all the specialists trained in 1940. In 1963, the proportion had jumped to 36.6 and 46.5 per cent. The number of engineers trained in the USSR has long been larger than in any capitalist country, including the United States of America. In 1960, for example, the USSR graduated 120,000 engineers, 270 per cent more than the United States. At present, there are 1,420,000 engineers and 2,446,000 technicians employed in the USSR economy, or more than 36.9 per cent of all the specialists with higher and secondary specialized education. This compares with 25.5 per cent at the end of 1940.

The proportion of teachers, librarians and other workers in cultural and educational fields has fallen from 34.8 per cent of the specialists in 1940 to 26.8 per cent in 1963, although their absolute number rose from 836,800 to 2,807,900 during the same period, an increase of 330 per cent, compared with a general population increase of only 18 per cent. Such a relatively steep rise in the number of teachers and workers in cultural and educational fields was essential to the country's requirements in general secondary education. There was also a qualitative change in structure: at the beginning of 1941 only 36 per cent of specialist teachers and workers in cultural and educational fields had received higher education. In 1963 it was 58 per cent. This change in the structure of specialist-teaching staff reflects a systematic bolstering of primary-school staff with teachers who have received higher education.

The growing number of specialists graduating from higher and secondary specialized institutes, especially in the post-war years, ensured an increase in the number of employed in the national economy (other than in the armed forces) from 136,000 in 1913 to 4,282,000 in 1963, a thirty-one-fold increase, and from 54,000 with secondary specialized education to 6,200,000, a 115-fold increase. The supply of specialized personnel to all branches of the national economy and culture increased considerably. The average number of specialists per thousand workers, over the whole national economy, has tripled in the post-war period alone. This includes a 330 per cent increase in industry and a 137 per cent increase in agriculture and forestry (see table 42). At the moment, every tenth worker among the 90 million employed has received higher or secondary specialized education, while in such branches as education and public health every second worker is specialized.

The Soviet Union's progress in the development of higher and secondary specialized education and in training large numbers of specialists is generally recognized. It has been achieved in a once-backward country, in an historically short period of time, thanks to the socialist system, with its planned management of the national economy, and the day-to-day attention paid by the Communist Party and Soviet government to the development of the working people. The USSR now has at its disposal the highly skilled specialists it needs. The essential material and cultural conditions for the success of communist construction in the USSR have been created by the labour of the Soviet people, including the 10 million-strong army of specialists.

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[text continued on p. 138]

Table 41. Number of specialists with higher and secondary specialized education, employed in the national economy of the USSR, by specialization, from 1928 to 1963 (in thousands)

		1928	1 Jan. 1941	1 Jan. 1946	1 July 1950	1 July 1955	1 Dec. 1960	1 Dec. 1963	1963 as % of 1941
Number of specialists with higher education in the national economy (N) and percentage in proportion to annual total (P)	N	233.0	909.0	986.9	1 442.8	2 184.0	3 545.2	4 282.6	
	P	100	100	100	100	100	100	100	471.1
Engineers	N	47.0	289.9	277.5	392.4	585.9	1 115.5	1 420.5	
	P	20.2	31.9	30.9	27.2	26.8	31.5	33.2	481.8
Agricultural and livestock specialists, veterinary surgeons and sylviculturists	N	28.0	69.9	59.4	109.5	158.7	241.8	267.1	
	P	12.0	7.7	6.6	7.6	7.3	6.8	6.2	412.8
Economists and statisticians	N	13.0	57.0	48.3	72.8	105.2	197.7	252.7	
	P	5.6	6.2	5.4	5.1	4.8	5.6	5.9	443.3
Commodity experts	N		2.3	4.8	4.7	8.6	19.3	26.0	
	P		0.3	0.2	0.3	0.4	0.5	0.6	1 130.4
Jurists	N	13.0	20.9	15.6	25.1	47.1	69.8	78.0	
	P	5.6	2.3	1.7	1.7	2.2	2.0	1.8	373.2
Doctors (excluding dentists)	N	63.0	141.8	126.2	232.4	299.0	400.6	460.1	
	P	27.0	15.6	14.1	16.1	13.7	11.3	10.7	324.5
Teachers and education specialists; librarians and cultural-educational workers	N	59.0	300.4	333.3	556.7	906.4	1 378.1	1 629.1	
	P	25.3	33.1	37.2	38.6	41.5	38.9	38	542.3
Number of specialists with secondary education in the national economy (N) and percentage in proportion to annual total (P)	N	288.0	1 492.2	...	([a])2 629.4	2 949.1	5 238.5	6 200.9	
	P	100	100	...	100	100	100	100	415.5
Technicians	N	51	324.2		716.6	804.9	1 955.8	2 446.4	
	P	17.7	21.7		27.3	27.3	37.3	39.5	754.6
Agricultural and livestock specialists, veterinary assistants and technicians	N	31	88.7		227.6	254.4	356.3	410.6	
	P	10.8	5.9		8.7	8.6	6.8	6.6	462.9
Statisticians and planners	N	([b])	30.9		([b])	([b])	337.5	451.6	
	P		2.1				6.4	7.3	1 461.5
Commodity experts	N	([b])	5.3		([b])	([b])	106.7	155.0	
	P		0.4				2.0	2.7	3 113.2
Jurists	N	2	6.2		24.7	23.2	17.2	15.2	
	P	0.7	0.4		1.0	0.8	0.3	0.2	245.5
Medical workers (including dentists)	N	48	393.2		645.8	731.1	1 187.3	1 294.4	
	P	16.7	26.4		24.6	24.8	22.7	20.9	329.2
Teachers, librarians and cultural-educational workers	N	137	536.4		763.2	818.6	1 061.9	1 178.8	
	P	47.5	35.9		29.0	27.8	20.3	19.0	219.8

a. On 1 April 1954

b. For both 'Statisticians and planners' and 'Commodity experts', there were: in 1928: N = 60; P = 2.1; on 1 July 1950: N = 158.4; P = 6; on 1 July 1955: N = 186.1; P = 6.3

Table 42. Number of workers and specialists employed in the USSR national economy (in thousands) and average number of specialists per 1,000 workers, by specialization, in 1940, 1960 and 1963 (on 1 December of each year)

Branches in the national economy	Total number of workers employed in the national economy			Total number of specialists			Number of specialists with higher education			Number of specialists with secondary education		
	1940	1960	1963	1940	1960	1963	1940	1960	1963	1940	1960	1963
Total in the national economy	62 400	86 600	90 840	2 400	8 784	10 483	909	3 545	4 283	1 492	5 239	6 200
Industry (including producers co-operatives)	13 200	24 600	27 000	311	1 667	2 120	153	494	612	158	1 173	1 510
Construction	1 600	5 100	6 487	40	304	400	17	93	134	23.7	211	270
Agriculture and sylviculture	32 000	29 800	28 000	49.7	420	611	12.2	110	184	37.5	310	427
Transport and communications	3 900	7 000	7 023	61	317	404	17	73	90	44.5	244	314
Trade, public catering, procurement, supply of technical materials	3 300	4 700	5 473	13	316	421	2	62	74	11.3	254	347
Public health	1 500	3 460	3 915	466	1 519	1 657	115	362	419	351	1 157	1 238
Education (schools, educational establishments, pre-school institutions and cultural-educational institutions)	2 660	4 800	5 427	944	2 445	2 830	344	1 349	1 594	600	1 096	1 236
Science and science research	360	1 760	2 857	122	802	1 130	91.2	542	728	31	260	402
Staffs of state and public administrations, boards of co-operative and public organizations, banking and insurance institutions	2 100	1 500	1 690	280	633	750	134.8	318	381	145.5	315	369

Branches in the national economy	Average number of specialists per 1,000 workers									Number of specialists with secondary education per 100 specialists with higher education			Increase in specialist-saturation in 1963 as compared with 1940		
	Total			Higher education			Secondary education						Higher and secondary specialized education	Higher education	Secondary specialized education
	1940	1960	1963	1940	1960	1963	1940	1960	1963	1940	1960	1963			
Total in the national economy	38.6	101	115	14.6	41	47	24	60	68	164	148	145	3	3.20	2.80
Industry (including producers co-operatives)	23.6	68	78	11.6	20	22	12	48	56	103	238	246	3.3	1.90	4.60
Construction	25.4	59	62	10.6	18	21	14.8	41	41	139	225	202	2.4	2.00	2.80
Agriculture and sylviculture	1.6	14	22	0.4	4	7	1.2	10	15	307	282	232	13.7	17.50	12.50
Transport and communications	15.8	45	57	4.4	10	13	11.4	35	44	262	335	349	3.6	3.00	3.90
Trade, public catering, procurement, supply of technical materials	4	67	76	0.6	13	13	3.4	54	63	566	410	270	19	21.70	18.50
Public health	311	441	423	77	105	107	234	336	316	305	320	296	1.3	1.39	1.35
Education (schools, educational establishments, pre-school institutions and culture-educational institutions)	355	510	521	129	281	293	226	219	228	174	81	77	1.5	2.30	1.00
Science and science research	338	455	395	252	307	255	86	148	140	34	48	55	1.2	1.00	1.60
Staffs of state and public administrations, boards of co-operative and public organizations, banking and insurance institutions	133	421	444	64	211	226	69	210	218	108	99	97	3.3	3.5	3.10

Section II DETERMINATION OF THE REQUIREMENTS OF THE NATIONAL ECONOMY IN SPECIALISTS

In the USSR the State attaches great importance to studying requirements for specialists with higher and secondary specialized education, as the basis for planning their training. As has been pointed out, even when the first five-year plan for national economic development (1928-33) was being drawn up, a great deal of work was done in devising a methodology for computing and determining requirements in specialists. The computation of these requirements has gone on improving in subsequent years.

During the fifth five-year plan (1951-55) the developing higher and secondary specialized establishments began to graduate specialists in sufficient numbers to satisfy the basic requirements of the national economy and culture. In some specialized fields the number graduating even exceeded slightly the stated requirements;in some others, particularly in new branches of specialized technology and in specializations connected with the automation and mechanization of production processes, the number of specialists was still lower than what was needed. As a result, it became necessary to improve planning. In the first place, study was made of the actual requirements of the various branches of the national economy and culture, since this was the only basis on which current and long-term plans could be worked out for the admission and graduation of specialists. To plan for graduation of specialists five years ahead, of course, is not too difficult, since it is already predetermined by the numbers of students currently enrolled. It is much more difficult to plan admissions for five years or more ahead; in other words, to plan the number graduating nine to eleven years ahead, depending on the length of training. Yet this is essential in order to take timely action to expand the physical plant of the institutes, train the necessary teaching staff, etc.

In order to improve further the planning of specialist training, the Soviet government and the CPSU Central Committee suggested to ministries, government departments and the councils of ministers of Union republics, as far back as 1954, that they should work out and adopt within the framework of the labour plan, classified lists of posts to be filled by specialists with higher or secondary specialized education and that they should submit annually well-based figures, by economic regions, for the current and long-term requirements in specialists.

These standard lists of the specialization courses provided by higher and secondary specialized institutes are basic in assessing needs. They are amended and amplified as necessary by the USSR Ministry of Higher and Secondary Specialized Education, with the agreement of the USSR Gosplan. Lists of the specializations taught in higher and secondary specialized institutes operating at the present time in the USSR are given in annexes X and XI.

The USSR Gosplan, in conjunction with the USSR Ministry of Higher and Secondary Specialized Education, issues procedural instructions and fixes the period to be covered by the reports and the order in which figures for the current and long-term requirements are to be presented. The figures for long-term requirements in specialists - up to seven to ten years ahead - are, as a rule, worked out annually; estimates of current requirements, i.e., for the coming year, are submitted annually and constitute the planning basis for directing the placement of young specialists who are completing higher and secondary specialized education. They are also used for planning specialist training.

Figures for requirements in specialists are compiled by all enterprises and organizations, ministries, departments and national economy councils (sovnarkhozes) of economic regions and submitted on standard forms (annex XII) to their own higher authority - from enterprise or institution to Union republic Gosplan, USSR ministry or department - which consolidates and analyses them and transmits them to the USSR Gosplan and USSR Ministry for Higher and Secondary Specialized Education. The estimates of long-term requirements in specialists are of great national economic interest: they provide consolidated information on the demand for specialists in the whole economy, as well as in that of each economic region and Union republic, and so make it possible to improve the planning of specialist-training and the geographical distribution of educational institutes and departments.

One of the prerequisites for planning specialist training is improved methods of estimating requirements. It is therefore advisable to present here a fairly full account of the two methods adopted in the USSR - one based on the classified lists of posts that have to be filled by specialists with higher and secondary specialized education, and the other based on the relative requirements in specialists (specialist-saturation requirements) of branches of the national economy and culture. We will then make a thorough study of their advantages and drawbacks and offer recommendations on organizing the job of determining requirements in specialists.

These two methods do not, of course, exhaust all the possible approaches to solving this problem, nor do they claim to offer a definitive solution. Nevertheless, as experience has shown, they do make it possible, under the planned economy of the USSR, to obtain sufficiently well-founded data on the requirements in specialists from the standpoint of the long-term development of the national economy and culture. It is hoped that such experience as we have accumulated in the USSR in determining requirements in specialists will be of interest not only to socialist countries with a planned national economy but also to many other countries.

A. METHOD OF ESTIMATING SPECIALIST REQUIREMENTS, USING THE NOMENCLATURE OF POSITIONS

The method of estimating requirements in specialists based on classified lists of posts, which has been and is still used in the USSR for estimating those requirements, is the following: classified lists of the posts to be filled by specialists with higher and secondary specialized education are drawn up and amended as necessary; on the basis of these lists and of development plans of a particular enterprise, sovkhoz, institution, branch of the national economy or culture, as well as the number of specialists available and series of other indices and data, separate estimates are made of the additional requirements in specialists: (a) to meet the growth in the number of posts to be filled by specialists or the growth in the number of specialists consequent on the expansion of production and the establishment of new enterprises and organizations in the planning period, allowance being made for all factors likely to increase or reduce the number of posts needed; (b) to compensate for the drop-out of graduated specialists and of factory-trained workers (praktiki) employed in specialist posts.

Estimates of additional requirements in specialists with higher and secondary specialized education are made separately - using the model form shown in annex XII. The figures must show exactly how many specialists are needed, not over-all requirements in specialists. The latter is the number of specialists needed in a particular planning year by the national economy of the USSR (or by a particular enterprise, national economy council, Union republic or branch of the national economy or culture) in order to fulfil the national economic plan. Additional requirements in specialists are the numbers required by the national economy in a particular planning year over and above the probable number available. Since additional requirements of a particular enterprise, economic region or even Union republic, can be met in part by transferring specialists who are in employment, it is the number on a national level who will have to be graduated in a particular year from educational establishments.

1. Classified lists of posts to be filled by specialists

The purpose of drawing up a classified list of each enterprise and institution, national economic council, ministry and department is to ascertain which posts in industrial and agricultural enterprises, on construction sites, in design or planning and scientific research organizations, and also in institutions with administrative or managerial functions, need to be filled by specialists and what education (higher or secondary) they should have.

The classified list of posts includes all the structural sub-divisions of the particular council of natural economy, ministry or department, enterprise or organization, and all engineering, technical and similar posts, as shown in the staffing schedule.

All the posts are enumerated. The question as to the degree of training necessary for a specific job is decided on its own merits (for example, it might be felt advisable to replace a particular post listed as 'engineer' by a technician or vice versa). The basic criteria are the duties to be performed, with allowance for possible changes in the demands made on the person holding the post. If it is decided that a particular post will in future be filled by a worker with different qualifications (for example, a 'technician' being replaced by an engineer or vice versa), then the appropriate changes will be made the next time the staffing schedule is reviewed.

The classified list may mention all enterprises, organizations and institutions subordinate to a given ministry, national economic council or department, enumerating all the posts or, when there is a large number of similar organizations in a particular council of national economy, ministry or department, the structural sub-divisions and posts may be classified. This gives a model which is used to work out classified lists of posts for each enterprise and organization that have to be filled by specialists with higher or secondary specialized education.

Classified lists of posts to be filled by specialists with higher or secondary specialized education follow the model provided in annex XIII.

As a rule, the information indicates the number of each type of post, as well as the quantity of engineers, technicians and similar posts foreseen in the establishment schedules of organizations and enterprises. The purpose is to establish a definite ratio between specialists with higher and those with secondary education and to determine the staff structure required for the various specializations. Classified lists may, however, also be drawn up without giving the number of posts and during the 1950s classified lists were, for the most part, drawn up in the USSR without showing the number. This had to be changed when the necessity was recognized for more thorough planning of the ratio between posts to be filled by specialists with higher education and those to be filled by specialists with secondary qualifications. This system was introduced only recently.

The classified lists also provide that information be supplied on all posts and appointments which, without falling into the category of engineering, technical and related posts, nevertheless, call for specialists. This need is constantly increasing as technical progress is made in the various branches of the national economy.

The lists are compiled and approved by each USSR ministry, state committee and department, in agreement with the USSR Gosplan, the USSR Ministry for Higher and Secondary Specialized Education, the USSR Ministry of Finance and the USSR State Committee on Labour and Wages. They constitute a very bulky document and it is therefore not feasible to give a complete example of one here; we confine ourselves to giving an excerpt in annex XIV.

On the basis of the classified lists and the establishment schedules in force on a given date, a count is taken of all posts for which higher or secondary specialized qualifications are required in each specialization. The total posts and jobs to be filled by specialists and the number of such personnel actually employed on a given date (base year) constitute the basic data for estimating additional requirements. These data are shown in an estimate table (annex XII).

In the figures for the specialists available with secondary specialized qualifications, those persons holding posts not included in the classified list of posts are shown separately (column 5 in annex XII). This is necessary, first, in order to have comparable data on the number of posts to be filled by specialists and the number employed in those posts, so that the quantity of working specialists without formal education can be determined. Secondly, it makes possible a thorough study of the advisability of using specialists and deciding which of them should be included in the estimates of requirements of the years following.

The classified list is valuable because it shows not only to what extent the various branches of the national economy and culture are adequately staffed with skilled staff but it also provides an analysis of the structure and employment of engineers, agronomists and other specialists, thus permitting action to improve their distribution and efficiency.

The essential condition in compiling a classified list of posts is accurate judgements as to which category of specialist should occupy a given post, whether the specialist concerned should possess higher or secondary qualifications. On this basis, definite ratios can be established. This is very important because the absolute figures involved are very high and the ratio is the decisive factor in determining the need for specialists with higher or with secondary qualifications. In 1963, for instance, the ratio of the number of specialists with higher qualifications to those with secondary qualifications was 1:1.45. Even a slight change in this ratio to 1:1.46 would mean reducing the number of specialists with higher qualifications by more than 20,000.

As has already been indicated, during the first five-year plan specialist-training planning was geared to a target ratio of not less than two to three between engineers and technicians by the end of the five-year period. When decisions were made on needs in specialists and specialist training for branches of industry, construction, agriculture, transport and communications during the 1950s, the planning followed resolution 1863 of the USSR Council of Ministers and the CPSU Central Committee, dated 30 August 1954. The target was one specialist possessing higher qualifications to every two to four possessing secondary education, depending on the special characteristics of particular branches of the national economy. This ratio was attained by 1960. In that year, for every ten persons with higher education, the number of specialists with secondary qualification was as follows: industry, twenty-four; transport and communications, thirty-three; construction, twenty-two; agriculture, twenty-eight (see table 42, p. 137).

For the current ten-year period in the USSR it has been decided, under resolution 533 of the USSR Council of Ministers and the CPSU Central Committee, dated 9 May 1963, to raise the target ratio between specialists with higher and those with secondary technical qualifications in industry, construction, transport, communications, and agriculture to 1:3 or 1:4 by 1970.

The proposed ratio between higher and secondary qualifications for other branches of the national economy and culture makes allowance for the specific characteristics of each branch, for the ratio already existing and, especially, for plans for the further reinforcement of such branches by highly qualified personnel. For example, in specialized teacher training, the aim is to achieve universal compulsory secondary education and to train enough specialized teachers with higher qualifications to staff all senior (5 to 10) grades in secondary schools and, in certain republics, all secondary-school grades, including grades 1 to 4.

In recent years the proportion of teachers with higher qualifications has greatly increased. In 1940, for instance, the number of specialists graduated from teacher-training institutes was 147,300 of whom there were ten with higher education for every fourteen with secondary education; in 1960 the comparable figures were 188,000 with a ratio of less than four specialists with secondary education to ten with higher qualifications. Under the 1958 law adopted by the Supreme Soviet of the USSR, it is envisaged that ultimately all schools, including primary, will be staffed entirely by teachers possessing higher educational qualifications.

2. Estimate of specialist requirements and effects of the increase of positions

In calculating the number of specialists needed to cover the increase in the number of posts to be filled by those with higher and secondary specialized education, ministries and departments, national economy councils, building sites and other organizations and institutions take as a basis the development plans of the enterprise concerned, of the branch or economic region. They then estimate the number of specialists needed for enterprises recently brought into operation, for newly created scientific-research institutes, design offices and other organizations and for the expansion and organization of new production lines in existing enterprises, etc. The number of specialists needed will be determined on the basis of the nomenclature of posts and the establishment lists of similar technically and economically advanced enterprises and organizations that are already operating, or on standard staff lists, if these are available.

Estimates of requirements in specialists to cover an increased number of posts are the most complicated to compile since it is essential to make sufficiently accurate allowance for many factors which have a bearing on such changes. Among the factors which tend to increase the number of posts needed are: (a) the expansion or establishment during the planning period of new enterprises, workshops and departments, scientific-research organizations, design offices, laboratories and other sub-divisions and organizations of industry, construction, transport and communications, agriculture and other branches of the national economy; (b) a rise in the proportion of technical engineering work and, in general, of specialists' work in the total input of labour as a result of changes in the nature of the work and the necessity of replacing a number of workers by specialists when introducing new techniques or technology, moving over to a more complicated line of production, developing scientific-research operations, or because executive and administrative functions become more complicated with the gradually wider application of scientific inventions and the introduction of new production techniques; (c) reductions in the length of the working day, etc.

Among the factors tending to reduce the number of specialists may be mentioned: (a) improvements in the administrative system and organizational structure of enterprises and organizations (consolidation of shops, transition to unified systems in small enterprises, merging of small-scale building organizations, etc.), cutting down overstaffing; (b) mechanization of administrative duties and specialists' work, use of tabulating machines and electronic computers for production control, complicated engineering calculations and economic estimates; (c) release of engineers, technicians and other specialists from duties that do not require their competence.

Specific factors in individual branches of the national economy and culture have an effect on increasing or reducing the number of specialist posts. In education, for instance, there are changes in the numbers of children of school age, the size of classes, the teaching-load, the structural composition of secondary schools - number of boarding schools, of extended-day-care schools, etc.

As a consequence of the technological advance made in industry, construction and agriculture, the proportion of engineers and technicians in these branches of the national economy is rising continuously. Further improvement in the industrial qualifications and general educational level of workers and employees is indispensable for technological progress as is a further increase in the number of specialists who have mastered the latest achievements of Soviet and foreign science and technology, who are well acquainted with the practical side of a subject and are capable not only of taking full advantage of modern technology but also of creating the technology of the future. In industry, for example, the proportion of engineers and technicians in the total number of industrial-production personnel has risen from 5 per cent in 1932 to 9 per cent in 1960 and in construction from 3.1 per cent to 7 per cent. There has also been a steep rise in the number of workers employed in scientific institutions and organizations and their ancillary services where the proportion of specialist work is very high.

Estimates of the number of additional specialists needed in categories such as economics, law, public health and physical culture, the arts, and also in all specializations in universities, teacher-training and librarianship institutes have special features of their own. To take one example, it is important in determining teaching specializations to have quite accurate figures on the size of the population between the ages of 7 and 17 or 18 of a given region, republic or country as a whole, at any rate for the next ten to fifteen years (by separate years), since all school-age children in the USSR are to be provided with full secondary education. This is equally true for estimates of the potential enrolment of pupils in general-education polytechnical schools, boarding schools, extended-day-care schools, vocational-technical schools, technicums and other secondary educational establishments for each scholastic year, in view of the fact that the norms applying to the number of pupils per teacher are not identical in different types of secondary educational establishments. It is also essential to analyse carefully what changes will occur in the number of classes and the average number of pupils in a class, the teaching-load of the teachers, etc. Moreover, it is specially important to make a correct calculation by specializations of teaching staff requirements - one that is based on a thorough analysis of the curricula of secondary schools and other secondary teaching establishments and of possible long-term changes therein. Even an insignificant alteration in the curricula of secondary schools - in view of the large number of pupils being taught in USSR secondary schools - will produce appreciable changes in the numbers of skilled teachers required. Calculations show, for instance, that an increase of one hour a week in the number of hours allotted in the curricula to mathematics in grades 5-7 in the country's secondary schools only will make it necessary to have more than 20,000 additional mathematic teachers. It is, furthermore, essential to know the number of teachers in specialized subjects and the number of them expected to graduate in the years immediately ahead. This can be determined by the admissions to educational establishments in previous years.

These estimates of the needed number of teachers are of great interest to all countries. They must be precise since the number of teachers required is very high and even a small percentage mistake may result in considerable inaccuracy in the absolute figures. The number of teachers just in schools of general education in the USSR amounts to more than 2 million and is constantly increasing. Estimates of requirements in teachers for all types of schools of general education in the USSR take into account the above-mentioned factors and are subdivided according to towns or villages as in the specimen forms shown in annexes XV, XVI and XVII.

Let us cite here a few of the USSR norms which are used in these estimates. The average number of pupils per class in schools of general education must not exceed forty, and in secondary general-educational labour polytechnics (grades 9-11), it must not exceed thirty-five. In a number of rural localities, especially in northern and thinly populated regions, the number of pupils per class is considerably below these norms. In evening (shift) schools of general education for young industrial workers, the minimum for grades 3-8 is twenty-five pupils and for grade 9 it is twenty; in individual cases grade 9 classes are opened in a rural locality with only fifteen pupils. In boarding schools (a new type of general-educational establishment which supplies full board) the number of pupils per class and of students per group is fixed at thirty; for lessons in labour, foreign languages and industrial training a class is divided into two half-groups, if there are at least twenty pupils.

The number of hours per class per week under existing curricula for eight-year and secondary schools, including boarding schools and extended-day-care schools (where pupils study independently in school in the evenings under the teachers' supervision) amounts on average in grades 5-8 to about thirty-one to thirty-two hours and, where classes are divided into sub-groups for lessons in foreign languages or physical culture, to thirty-two to thirty-three hours; in grades 9-11 they amount to twenty-five to thirty and twenty-six to thirty-two hours respectively. The average number of hours per class per week is approximately the same in all the USSR republics, subject to special nationality circumstances. The average number of hours per week per class in the curricula of evening (shift) schools for young industrial and agricultural workers and of schools for adults amounts in grades 5-11 to nineteen to twenty-two hours.

The average teaching load per teacher in grades 5-11 in all types of schools amounts to eighteen to twenty hours per week. In grades 1-4, each teacher has one class. In addition, posts of supervisor-teachers are established in the following ratios: in extended-day-care schools, 1.5 units per group of pupils in grades 1-4 and one per group of pupils in grades 5-8, assuming each group to number thirty to forty pupils; in the case of boarding schools, each group of thirty pupils has two supervisor-teachers for grades 1-7 and one supervisor teacher for grades 8-11.

The estimate of the number of teachers required for other secondary educational establishments is made on more or less similar forms, i.e., for vocational-technical schools, factory apprenticeship schools and secondary specialized educational establishments.

The growth in the number of posts which need to be filled by specialists is calculated for each year of the planning period (see annex XII).

3. Estimate of needs in specialists to compensate for workers leaving their positions

The computation of the requirements in specialists to replace workers who drop out includes workers with non-formal education holding posts that have to be filled by specialists. In making up the estimates account is taken of natural losses: death, retirement on pension, mobilization and demobilization, the balance between the number of workers quitting for family reasons and returning to employment after an interval, etc. Account is taken of all posts which are to be occupied by specialists with higher education and those by specialists with specialized education, since their numbers differ.

It is recommended that the departures percentage adopted in these estimates be based on the statistics of changes in the number of workers in a given enterprise, institution, firm or branch over a number of recent years, taking into consideration the age-composition of the workers, their sex and other factors. If a regular record is kept of departures of specialists in a given enterprise or organization, then it will be a simple matter to define the departure-coefficient as the ratio of the number of specialists leaving every year to the total number of specialists at the beginning of the corresponding year and to base this percentage on the figures for at least ten years. Where necessary, it can be corrected to allow for the age-composition of the specialists and the special features of a particular industry or geographical area. The drop-out figure thus calculated will be correct for a given enterprise or organization but it will, as a general rule, be greater than the real percentage of losses for the over-all group of such enterprises under a ministry or department, since it counts as drop-out specialists redeployed within a given region or a ministerial or departmental system.

The percentage of loss of specialists for the USSR as a whole or for a republic or group of specializations is determined by comparing the statistics for the increase in the number of specialists for a specific period with the figures of specialists graduating for the same period or, more accurate, with the number of young specialists graduating from evening and correspondence course institutes and directed to the republic making the estimate, as well as graduates of day educational establishments. The percentage drop-out figure thus calculated does not count specialists redeployed and gives a more precise reflection of the natural loss in specialists. This is exactly what is needed for estimating requirements in, and planning the training of, young future specialists.

Estimates made by this method of the percentage drop-out figures show that, taking the USSR as a whole, the average annual loss of all specialists with higher education for the eleven years from 1950 to 1960 amounts to 3.2 per cent of the total number of specialists available at the beginning of each year; for engineers it was 2.1 per cent, agricultural experts, zootechnicians, veterinary surgeons and sylviculture experts - 4.3 per cent, economists, economic statisticians and commodity experts - 5.2 per cent, jurists - 7.6 per cent, physicians (not including dentists) - 1.3 per cent, teachers and university graduates, librarians and cultural-educational workers - 4.8 per cent.

Estimates of the annual percentage figure of the drop-out of specialists with secondary specialized education are made in similar fashion. All other conditions being equal, the drop-out figure for those specialists will be larger than for specialists with higher education, since a number of specialists with secondary specialized education obtain higher education and move into the more advanced category. For the years 1956-60 the percentage drop-out figure of specialists with secondary specialized education for the USSR as a whole amounted annually to 4.3 per cent.

Table 43 (on page 144) shows the approximate estimate of the percentage of specialists dropping out in the USSR in 1962.

A certain fall in this percentage in recent years is explained basically by the considerable increase in graduations of specialists in the USSR in those years, which raises their proportion in the total number of specialists, as well as by the measures adopted to reduce the size of the armed forces in the USSR.

The above drop-out percentage figures have been calculated in respect of specialists who in actual fact have higher or secondary specialized education. But these percentage figures can, with a fair degree of accuracy, be applied to the total number of workers holding posts which should, in accordance with the nomenclature, be filled by specialists with higher or secondary specialized education, inasmuch as, in the first place, most of the posts in question in a number of branches are in fact filled by specialists with higher and secondary specialized education and, in the second, workers with non-formal education (who generally were appointed to these posts at an older age than graduates for VUZy or technicums) do not occupy these specialist posts for as long.

The drop-out percentage of specialists and these 'praktiki' is not identical in the different branches of the national economy and in the different regions of the country: it is higher where the workers retire on pension earlier, and where the specialists are predominantly women. Women can also retire earlier and some leave for family reasons. It is lower in those regions where, over

Table 43. Estimate of percentage of average loss in specialists, in the USSR, in 1962

Specializations taught	Number of specialists On 1 Dec. 1962	Number of specialists On 1 Dec. 1961	Number of graduates in 1962	Number of new specialists	In thousands Loss in specialists	Losses in proportion to total number of specialists
Graduates of higher education						%
Total number of specialists	4 049.7	3 824.0	316.6	225.7	90.9	2.38
Engineers (technicians)	1 325.1	1 236.0	122.6	89.1	33.5	2.71
Agronomists, zootechnicians, veterinary surgeons, and sylviculturists	255.2	243.8	20.2	11.4	8.8	3.61
Economists, economists-statisticians, and commodity experts	259.9	239.9	30.3	20.0	10.3	4.29
Physicians (excluding dentists)	441.9	424.2	25.4	17.7	7.7	1.82
Teachers and education specialists, librarians and cultural-educational workers	1 548.0	1 473.8	105.0	74.2	30.8	2.09
Jurists	76.7	74.0	5.1	2.6	2.5	3.38
Graduates of secondary specialized education						
Total number of specialists	5 906.1	5 609.1	452.2	297.0	155.2	2.80
Engineers (technicians)	2 292.7	2 156.8	216.1	135.8	80.3	3.70
Agronomists, zootechnicians, veterinary surgeons, and sylviculturists	409.6	389.4	40.3	20.2	20.1	5.20
Economists, economists-statisticians, and commodity experts	560.5	506.1	76.0	54.4	21.6	4.30
Medical workers (including dentists)	1 251.9	1 222.5	58.9	29.4	29.5	2.40
Teachers and education specialists, librarians and cultural-educational workers	1 143.3	1 096.6	50.3	46.7	3.6	0.30
Jurists	16.2	16.5	—	—	0.3	1.80

a series of years, the number of specialists has been rising steadily and regularly. All these factors, as well as the age-composition of employed specialists, must be taken into account in determining the percentage adopted in long-term estimates for the loss of specialists with higher and secondary specialized education in a given Union republic or economic region.

4. Estimate of needs in specialists to replace 'praktiki'

The number of specialists required to replace workers trained in plants rather than schools is determined by making a thorough study of staff members who hold posts as specialists and executives but who have not received the usual required education. These data are utilized in developing measures for further improving their qualifications - primarily, by getting them to take evening and correspondence courses in higher and secondary specialized educational establishments. In this way they replace themselves since they become graduate specialists. In recent years especially, there has been a considerable expansion of the network of evening and correspondence course institutes and faculties operating directly in industrial and agricultural enterprises, and incentives are offered to students who are being trained without terminating employment, primarily to provide the 'praktiki' with opportunities for formal education.

The number of persons required to take the place of 'praktiki' still represents a big figure and so it cannot be left out of consideration. In the future, when practically all posts that have to be filled by specialists will be occupied by persons who have the requisite education, the need to make an estimate of requirements for replacing 'praktiki' will lapse.

Great importance is attached in our country to making a study of the requirements in specialists by utilizing the classified lists of posts. This work is continuously being improved, both in defining more exactly the norms used in making the estimates, with due allowance for the specific features of particular branches of the national economy and of economic regions, in providing statistical and other material for the estimates, and also in improving further the organization of the work in enterprises and institutions, in ministries and departments.

As a result, a number of steps have been taken in the country in recent years to improve the planning of specialist training so as to meet the demands for them from branches of the national economy and culture. In particular, measures have been adopted to augment substantially admissions of students to higher and secondary specialized educational establishments to study the new technology, primarily, the mechanization and automation of production and instrument-making, wireless engineering and wireless electronics, tabulators and computers, chemistry and several other subjects, with a view to satisfy more completely the constantly increasing demand for such specialists. Steps have also been taken to improve still further the geographic distribution of educational establishments, so as to bring them closer to industry and the areas where graduates will work in future - more especially, by establishing a number of large new higher educational establishments and expanding existing ones in western and eastern Siberia, in the Far East and in Kazakhstan; and by considerably expanding evening and correspondence course education, creating faculties of general technology in order to enable the widest possible number of workers to obtain an education.

Estimates of requirements in specialists made by utilizing the classified list of posts to be filled by specialists with higher and secondary specialized education, are based on concrete plans for the development of the national economy and culture for bringing into operation and expanding existing enterprises and organizations, labour plans and other planning indices. They ensure close liaison between plans for the development of the national economy and plans for the development of higher and secondary specialized education and they make it possible to determine the requirements in specialists by field. This is the great advantage of the described method of estimating requirements in specialists.

Nevertheless, the method in question can only, because of its special nature, be used to provide fairly accurate estimates of specialist requirements for five to seven years. Why five to seven years? Because the established practice in the USSR is to make detailed plans for the development of both the national economy and its individual sectors for five-year periods. Five-year plans with their estimates contain the necessary initial data for calculating the needs in specialists by the use of classified lists, in particular, the detailed lists for newly established enterprises and others to be put into operation during the five-year period and in the period immediately following. In practice, therefore, these lists determine the timing for new enterprises and the expansion of old ones for a period of five to seven years, and thus the need for specialists for the same period.

If this method is used for longer-term estimates of requirements, it is difficult to make sufficiently full allowance for the continuous process of qualitative changes in the nature of the work done by individual groups of workers caused by technological progress and the consequent need for increasing the proportion of specialists' work in the total labour input. Similarly, it is hard to make accurate allowance for increases in the size of the population and of the number of people employed in the national economy, for changes in the structure of the employed population in various sectors of national economy and culture and for several other factors which have a substantial bearing on the requirements in specialists and on changes in the structure of these requirements by groups of skills. In the case of estimates for a longer-term period, say, for the period of an additional decade, the above method would scarcely be applicable, especially since there is no need to make estimates for each skill. It would be sufficient to make them for more general categories, such as, for groups of educational establishments or for groups of specializations. Accordingly, in the case of long-term estimates of specialist requirements for the USSR national economy, the use of classified lists is accompanied by estimates of proportional needs in various branches of the national economy and culture for specialists with higher and secondary specialized education.

B. SATURATION RATE METHOD FOR ESTIMATING SPECIALIST REQUIREMENTS

The method of estimating the specialist-availability requirements of the national economy is as follows: on the basis of estimates of the probable size of the population for the planning years, including the final year of the planning period, the quantity of able-bodied workers is calculated. After deducting the probable number of persons training in educational establishments as full-time students and those employed in domestic and private jobs, we take the number of those employed in the national economy of a given economic region, Union republic and of the whole country. On the basis of these data and the long-term plans for the development of branches of the national economy, culture, and public health, the probable average annual number of the employed population for the given planning year will be determined for individual sectors: industry, construction, agriculture and sylviculture, transport and communications, trade and technical materials supply, communal housing, public health, education (persons employed in schools, educational establishments and cultural-educational institutions), science and science research, on the staffs of state and economic administrations and in other branches. If the need arises, the probable number can also be determined for more narrowly subdivided sectors, for example, for separate branches of industry: mechanical engineering, metallurgy, etc. On the basis of these data and the number of specialists per thousand, that is, the proportion of specialists to the total number of workers, as well as the proportion with higher and with secondary specialized education, the absolute or total requirement in specialists with higher and secondary specialized education will be determined for the planning year.

The estimate of the proportional specialist-availability requirements of branches of the national economy and culture for persons with higher and secondary specialized education forms the basis for a draft plan for the development of higher and secondary specialized education in the USSR up to 1980. The basic regulations and indices were adopted after being discussed in detail with the organizations concerned.

The method of estimating the specialist-availability requirements of the national economy is based on the objective natural trend of Soviet society to develop into a communist society. This includes the necessity for a further rise in the cultural and technological level of the working classes, the increase in the proportionate number of engineers and technicians in the staffs of the collectives of enterprises and, in general, of specialists in the total number of the employed as a consequence of changes in the nature of jobs, due to technological advance, the ever-greater extent of automation in manufacturing processes and in the sphere of administration and control; the need to provide full employment for the able-bodied population while maintaining a high level productivity. It also takes into account the tasks that face the higher and secondary specialized schools.

The calculation of specialist requirements by the above method allows for the trends and factors mentioned above, which have a considerable effect on raising or lowering the requirements in specialist staffs and of determining more accurately the real requirements of the national economy in specialists, especially for the long term.

We shall endeavour in this study to describe all the stages in estimating the requirements in specialists by the above method.

1. Estimate of the numbers of workers in each branch of the national economy

The first stage, namely, determining the expected size of the population by age groups and the expected number of workers and employees in the country as a whole, in a republic, or in an economic region, for each branch of the national economy and culture, has been described in chapter 1 of Part Two of this study.

These data, we have already pointed out, may be obtained from statistical and planning departments, or, if necessary, by the calculations described above, and are used to make estimates of the absolute requirements in specialists for the planning year.

2. Estimate of the proportion of specialists to the total number of workers

Special attention is paid to determining correctly the ratio of specialists to the total number of workers in each branch of the national economy and culture at the end of the planning period. This proportion is determined on the basis of statistical data about the actual number of specialists and qualified personnel without formal training at the beginning of the planning year per thousand workers and employees. Allowance is made for the variations occurring over a series of previous years and the necessary changes due to further technological advance.

Statistics show that in industry and its branches, and also in construction, the percentage of engineers and technicians in the total number of workers and employees has a tendency to rise steadily, a rise that accelerates as the industry modernizes and has a higher technological and organizational level. For instance, in USSR industry the proportion of engineers and technicians, including the 'praktiki', to the total number of workers rose 3.5 times between 1928 and 1963 and reached 10.4 per cent. In mechanical engineering and metal processing it amounts on an average to 14.1 per cent, and in some of its branches, such as mechanical power engineering, to 19.5 per cent, toolmaking 15.9 per cent, lathe-construction and instrument industry 15.1 per cent, and in the chemical industry where a part of specialists fill worker positions, 11.7 per cent. In many large mechanical engineering concerns the proportion of engineers and technicians is already 20 per cent. The proportion is highest in design and planning offices or scientific-research organizations. In such enterprises it is at present 30 per cent, or even more, of the industrial production personnel. Naturally, the widespread introduction of mechanization and automation creates conditions and produces the need for increasing the number of specialists in other enterprises also. In construction the proportion of engineers and technicians rose in the period between 1928 and 1962 from 3.1 per cent to 7.8 per cent.

It should be pointed out at this point that statistics showing the proportion of engineers and technicians do not fully reflect the actual labour input of specialists, since in the USSR the category of engineers and technicians does not cover all the specialists employed in a particular branch of the national economy. A considerable number of the specialists who perform executive or administrative functions in industry or construction are classified as employees, while specialists employed on work jobs come under the category of workers. Accordingly, in preparing estimates it is recommended that the proportion of the average number of specialists, and also of 'praktiki', per 1,000 workers in the base year should be calculated by dividing the actual number of specialists (or 'praktiki') in a particular branch of the national economy by the number of all the workers employed.

In USSR agriculture the proportion of specialists is at present relatively small. Nevertheless, it is continually increasing as kolkhozes and sovkhozes become more and more fully equipped with modern technical appliances, as agro-technical knowledge improves, and labour productivity in agriculture rises. The task of further increasing labour productivity in agriculture on the basis of mechanization and raising the level of agricultural technology is even now requiring a considerable increase in the proportion of specialists to the total number employed.

The proportion of specialists in such branches as education, including establishments preparing skilled workers, public health, science and science research, and also in state and economic administrative bodies in the USSR, already amounts to at least 40 to 50 per cent. Consequently, it will change in the future to a relatively lesser degree than in industry, construction and agriculture.

In determining the required number of specialists per 1,000 persons employed, what has to be borne in mind is the necessity to increase in the long run the proportion of specialists to the total number of workers and employees. On the basis of the present proportion and the rate at which it has been changing for a number of years, a target was set in industry, construction, agriculture and sylviculture, transport and communications and a number of other branches of material production and services to increase the number of specialists per 1,000 persons employed. A parallel rise was planned in the percentage of specialists with secondary education.

In industry, for instance, it is proposed to raise the average proportion of specialists with higher and secondary specialized education by 1980 to the level prevailing at present in the most modern enterprises, having regard to the special circumstances of the branch of industry in question.

In agriculture and sylviculture it is planned to have a larger increase in the number of specialists with higher and secondary specialized education so as to bring agriculture closer to the level of industry as regards technological equipment and organization of production and to transform agricultural labour into another kind of industrial job.

In such branches as education, public health and science and science research, plans are also being made to increase the proportion of specialists with higher education, but to a lesser degree than in other branches in view of the high level of specialist-sufficiency in these branches at the present time. The index figure of the number of specialists available per 1,000 persons employed in such branches as public health and education does not give a complete picture of how the country's needs are covered. More realistic figures illustrating the public health situation would be the number of physicians per 10,000 of the population and in education the number of teachers for every 1,000 children of school age. We stress the point that this is not the number of pupils in schools but precisely children of school age since this index figure shows the extent to which children are covered by schooling. It is, therefore, recommended that requirements in specialist staffs for education and public health should be estimated on the basis of the probable number of the population by age groups, with the standards for this requirement referred to population. The specialist proportions in these branches should only be used to determine the total number of employed persons, as already explained.

To illustrate the point, let us continue our estimate, set out in chapter 1, Part Two, for the requirements in specialists of USSR industry for the sixth five-year period. We had found that the number of workers and employees in USSR industry, not counting producers' co-operatives, would be approximately 20.6 million. In analysing the rates of changes in the proportion of engineers and technicians in the total number of employed persons for the years preceding the sixth five-year plan, we found that it was rising systematically from 8.5 per cent in 1950 to 8.9 per cent in 1955. It would, thus, be in order to assume, in making estimates, that the proportion of these workers would increase in 1960 approximately to 9.4 per cent. In these circumstances, the number of engineers and technicians for 1960 was calculated at the figure of 1,930,000 ($20.6 \times 0.094 = 1.93$), as against an actual figure of 1,900,000, which should be considered an excellent result for estimates of requirements in specialists.

Supplementary to the data shown in table 42 (see p. 137) about the proportion of specialists in major branches of the national economy and culture of the USSR and the rate at which it has changed over a number of years, table 44 gives data on the actual proportion of specialists in a more detailed breakdown of sectors of the USSR national economy and culture in 1963.

Determination of the absolute requirements in specialists or number of specialists for the planning year completes the second stage of preparing an estimate of requirements by the method described.

3. Estimate of the additional need of specialists

Additional requirements in specialists, i.e., the number of specialists who will have to be graduated during the planning period, will be determined on the basis of the number available in the base year and the total required in the planning year, allowance being made for the need to compensate for the annual drop-out of specialists with higher and secondary specialized education.

In the USSR, the number of specialists graduating is increasing every year and better use is being made of them. This means that there is a steady increase in the number of specialists recently graduated. There is, therefore, every justification for assuming a steady reduction in the drop-out percentage of specialists. (The method used for estimating the drop-out percentage of specialists with higher and secondary specialized education and the magnitudes of such figures have been given above.) In making the estimates it is advisable to apply, with appropriate adjustments, the actual percentage figures for each branch of the national economy.

The number of specialists graduating in the next few years is pre-determined by the enrolments of students in educational establishments, so that the probable annual number of specialists with higher education who will be available within the next five to six years and of specialists with secondary specialized education within four to five years (allowing for the study periods involved) will be determined by deducting from the number of specialists at the beginning of the year the number of those leaving and adding the number of specialists graduating in the year in question, using the following formula:

Formula 6

$$S_{b+1} = S_b(1-Cd_1) + Sg_1$$

$$S_{b+2} = S_{b+1}(1-Cd_2) + Sg_2, \text{ etc.}$$

where:

S_b = Number of specialists at the end of the base year

S_{b+1}, S_{b+2}, etc. = Number of specialists at the end of any given year in the planning period

Cd = Coefficient of the drop-out of specialists

Sg_1, Sg_2, etc. = Number of specialists graduated in each year (based on the student enrolment with due allowance made for drop-out during last years of the course).

For subsequent years the availability of specialists may be determined by the following formula:

Formula 7

$$S_p = S_b \cdot Ci_1 \cdot Ci_2 \ldots Ci_n$$

where:

S_p = Number of specialists at the end of the planning year

S_b = Number of specialists in the base year, i.e., at the end of the last year for which graduation is pre-determined by admissions in previous years

Ci = Coefficient of the increase in the number of specialists in each year

n = Number of years in the planning period

If we assume that there is no change during the planning period in the coefficient of the increase in the number of specialists and therefore that the number of specialists will increase regularly in geometrical progression, the formula becomes:

$$S_p = S_b \cdot Ci^n$$

In case the coefficient of the increase in the number of specialists varies for certain years of the plan to meet different planned rates of development of the national economy or its branches; for example, if it has one value (Ci_1) during the first eight years and another (Ci_2) during the subsequent five years, the formula becomes:

$$S_p = S_b \cdot Ci_1{}^8 \cdot Ci_2{}^5$$

With this formula, if we have data on the actual number of specialists in the base year and estimated data on the number of specialists or the absolute requirements for specialists for the planning year, the coefficient of the increase in the number of specialists and their total number can be determined for each year of the planning period. In estimating the coefficient, allowance is made for the probable expansion of the physical plant of educational establishments in the planning period.

The annual additional demand for specialists will increase in geometrical progression provided the percentage of specialists dropping out and the

Table 44. *Average numbers of specialists per 1,000 workers by branch of national economy and culture of the USSR, in 1963*

Branches of national economy and culture	Total	Higher education	Secondary specialized education
TOTAL IN NATIONAL ECONOMY AND CULTURE	115	47	68
Heavy industry	78	22	56
Ferrous metals	94	31	63
Non-ferrous metals	103	33	70
Oil-extracting	132	49	83
Oil-processing	140	44	96
Gas, peat, shale, and other branches of fuel industry	74	19	55
Production of electric and thermal power	158	52	106
Machine-construction and metal-processing	107	33	74
Power machinery construction	138	50	88
Electrical engineering	104	33	71
Machine-tool and instrument-making	113	36	77
Tool-making	127	43	84
Manufacture of equipment	118	37	81
Lifting, hoisting, and transport machinery construction	116	35	81
Building and road-making machinery construction	117	32	85
Transport machinery construction	122	36	86
Motor vehicle	98	29	69
Tractor and agricultural machinery construction	91	29	62
Chemistry industry	123	41	82
Timber, paper, and wood-working	42	11	31
Lumber operations	34	9	25
Wood-working	44	12	32
Paper	73	20	53
Building materials	63	16	47
Light industry	45	9	36
Textile	46	10	36
Garment	40	6	34
Leather, fur, and footwear	49	12	37
Foodstuffs	71	21	50
Building construction	62	21	41
Agriculture	20	6	14
Kolkhozes	10	2	8
Sovkhozes and ancillary agricultural enterprises, veterinary services	39	14	25
Sylviculture	11	4	7
Transport	56	13	43
Railway	57	16	41
Water	14	4	10
Motor vehicle, municipal, electromotive and other transport: loading-unloading operations	44	8	36
Communications	68	10	58
Trade, public catering, procurement technical materials supplies	76	13	63
Communal housing	35	8	37
Public health	423	107	316
Education	521	293	228
Educational establishments preparing skilled workers	474	352	122
General education schools	607	344	263
Pre-school institutions, kindergartens, etc.	315	65	250
Cultural-educational institutions	274	86	188
Science and science research	395	255	140
Scientific and scientific research institutions	377	266	111
Organizations of design	410	239	171
Geological surveying organizations	214	105	109
Hydro-meteorological services	276	99	177
Planning and prospecting organizations	607	388	219
Banking and insurance organizations	315	73	242
Staffs of state and public administrative organs, and boards of co-operative and public organizations	470	257	213
Other branches	93	44	49
Public entertainment enterprises and art institutes	107	48	59
Organizations publishing and editing newspapers and magazines	441	346	95
Other organizations, not listed by branches	73	25	48

coefficient of the increase in the number of specialists every year remain constant and the denominator of that progression may be found as follows. The additional requirement in specialists in the year concerned (R_c) is equal to the difference between the number of specialists at the end of the year (S_c) and the previous year (S_{c-1}), plus the number of specialists required to compensate for those dropping out, that is:

Formula 8

$$
\begin{aligned}
R_c &= S_c - S_{c-1} + S_{c-1} . Cd_c \\
&= S_{c-1} . Ci_c - S_{c-1} + S_{c-1} . Cd_c \\
&= S_{c-1} (Ci_c + Cd_c - 1)
\end{aligned}
$$

Provided Ci and Cd are constant, the relation of the requirements for a given year to those for previous year will be:

$$\frac{R_c}{R_{c-1}} = \frac{S_{c-1}\,(Ci + Cd - 1)}{S_{c-2}\,(Ci + Cd - 1)} = \frac{S_{c-1}}{S_{c-2}} = Ci$$

hence: $R_c = R_{c-1} . Ci$, or

Formula 9

$$R_n = R_b . Ci^n$$

where:

R_c = Additional requirements in the year concerned

R_b = Additional requirements in the base year

Ci = Coefficient of annual increase in the number of specialists

n = Number of years in the planning period

Thus, when the drop-out percentage of specialists and the coefficient of the annual rise in number of specialists are constant, additional requirements change from year to year in geometrical progression, whose denominator is the coefficient of the rise in the number of specialists.

A model form for an approximate estimate of additional requirements in specialists with higher and secondary specialized education of an individual branch of the national economy for the years 1964/75 is given in annex XVIII.

An extremely important step in estimating requirements by the method described is that of determining how many are needed for specializations and groups of specializations.

It is advisable, while utilizing the statistical data on the number of specialists at the outset of the planning period in each of the branches of the national economy and culture to determine their composition by specializations (in practice it is sufficient to do so by specialization groups), that is, the percentage of specialists of each type in the total number of specialists in the various branches of the national economy and culture in the planning year. On this basis one can determine the number of specialists by groups and, where necessary, also by specializations, for the planning year. It should, however, be pointed out that such an estimate will not always show the exact composition of specialist staffs actually necessary in the planning year, since it takes only partly into account the changes due to modifications in the structure of various branches of the national economy and culture but not of the necessary changes within each branch. Furthermore, it copies the existing structure with its inherent defects as regards the distribution and utilization of specialist staffs within branches. Herewith, a few examples to explain this point. It is, for instance, quite obvious that in the immediate future it will be necessary to enlarge considerably the number of posts to be filled by specialists in new technology of tabulating machines and electronic computers and this will be accompanied by a relative reduction in specialist posts of a different type. For a variety of reasons, a certain number of specialists are at present working in the branches for which they were not trained and which are not directly connected with their specialization. In order to make general educational schools more completely polytechnical, it will be necessary in the long run to increase considerably the proportion of teachers with engineering and agricultural training to the total number of teachers, something which has not so far been sufficiently reflected in the existing structure of the teaching staffs of secondary schools. If the present structure of specialists by specializations in a particular branch were to be accepted for the long run, we would retain in the future these defects in the distribution and utilization of specialists.

Accordingly, when determining the structure of specialized personnel and additional requirements on a long-term basis, it is recommended that a thorough analysis be made not only of the structure at the beginning of the planning period but also of modern enterprises which are technologically advanced and of organizations in every branch of the national economy and culture. A similar analysis should also be made of trends towards a change in the estimated current and long-term requirements in specialists, utilizing the classification of posts and expected graduations of specialists. Using these as a basis, it is possible to identify and take into account the needed changes in the additional requirements in specialists in the planning period.

This kind of study results in allowance in planning for such typical trends in changes in the structure of requirements of the USSR national economy for additional specialists as a systematic increase in the proportion of engineers to the total number of specialists graduating, more especially in specializations concerned with new branches of technology, power (including atomic power), electrical engineering, the making of electrical instruments, radio electronics and electronic engineering, mechanical engineering and tool-making and chemical technology. A considerable increase was also foreseen in the graduation of specialists in agricultural and biological specializations, and in mathematics, physics and chemistry.

Estimates of requirements made by the above method employ generalized technical and economic indices, demographic and statistical data; but their range is considerably narrower than when requirements are estimated on the basis of classified lists, not to mention the fact that it is practically impossible to estimate requirements for a long period on the latter basis. The regular trends of changes in requirements depend on the indices of the development of the national economy and culture and their individual branches, of the size of the population and of labour resources. They can, as we have shown, be expressed mathematically, which means that for such estimates tabulating machines can be used and optimum variants found of the plans for developing higher and secondary specialized education.

In practice, the two methods are used at the same time, or, more precisely, if it can be stated thus, estimates are made by the two methods simultaneously and consecutively. When it is necessary to determine the need for specialists in drafting plans for the admission of students to higher and secondary specialized educational institutions (we emphasize plans of admission lest they be mistaken for the requirements for specialists in the following year, plans which are announced annually by all ministries and departments of the USSR and Union republics, and which are based on the main, on the classified lists), the estimates are made for a number of years, taking into account the duration of study in educational institutions, and for the planning period, particularly if the plan of admissions covers several years.

At present in the USSR, education in VUZy in full-time departments, depending on the specialization, lasts four years; or four years, four months; four years, six months; five years; five years, six months; and even six years. In evening and correspondence systems of education, in comparison, study lasts six months to one year longer. In other words, in higher educational establishments the periods of education are from four to six years, except for a few specializations in the evening and correspondence departments which last more than six years. In secondary specialized educational institutions, full-time departments require three years; three years, six months; and four years, of study for those with eight previous years of schooling. For those with complete secondary education, one year, six months; two years; two years, six months; and two years, ten months. For evening and correspondence system of education, six months more are added; in technicums, consequently, the periods of education are from one year, six months to four years, six months; and in higher and secondary specialized educational institutions generally from one year, six months to six years.

This means that students admitted to higher and secondary specialized educational institutions, for example in 1966, will terminate between 1968 and, 1972, i.e., scattered over five years, beginning with the second year of the planning period, and ending in the sixth. Counting backwards as is done in planning specialist training according to need in the national economy, you must know the needs for five years in order to make admission plans for one. Lastly, it would seem reasonable to note that there is no need to define, for a given specific specialization requiring four years of training, the need in each of the five years because in other specializations and forms of education, the period of education is longer or shorter. However, the heart of the question lies in the fact that it is difficult to imagine, and is practically impossible and to no purpose to demand from industry and from other sectors of the national economy, estimates of specialists according to specialization for different years which take into account the duration of the period of education.

For example, if we speak of the admissions for 1966, we cannot ask them to determine their needs for graduates from technicums in 1969, for engineers in 1971, economists in 1970, and for radio-engineers in 1972, and so forth, as the ministry of industry is not interested in the periods of education, but in having specialists in a definite year for specific industries and organizations. For this reason, it must be the organs planning the development of higher and secondary specialized education who take into account the length of the period of study and the number of students to be trained, that is, the need in specialists. In order to make this possible, industry and other branches of the national economy, that is, those who will employ the specialists, are asked to present their needs for specialists for a number of years, actually for five to seven years, to help draft the plan of admissions for the current year and for the next ten to twelve years, and for the five-year plan. For just such a period it is necessary to determine the need in specialists.

As we already mentioned, the use of the classified list of positions makes it possible to determine the need of specialists according to specializations, branches of the national economy and geographical regions for the next five to seven years and thus plan admissions for the following calendar year, which is essential in drafting yearly plans. Furthermore, as was indicated in the analysis of the length of education and its influence on admissions policies, this method makes it possible to plan admissions by specializations for a number of years, at the time of the elaboration of the five-year plan, for specializations which do not exceed six years of study. If the period of education is four years and the need is determined for seven years, it is possible to plan admissions for the first three years of the five-year plan, in our example for 1966-69, and even for all the five years, in secondary specialized educational institutions where courses last two years.

It is also necessary to note the possibilities that planning organs have because of the length of period of specialized education, to increase the training of future specialists as needs change. Thus, if for any reason the need for technicians in 1968, calculated in 1965, is greater than the 1963 estimates despite the fact that graduates of eight-year schools were admitted in 1964, the 1968 target can be reached for that specialization by admitting in 1966 secondary school graduates for whom training will be of shorter duration.

The method of defining through the classified lists of positions the need to increase the number of specialists with higher and secondary specialized education is thus used in estimating the need for the planned distribution of specialists and the planned admissions of students for the current year. But it is only partly applicable in the drafting of five-year plans, where, as we already stated, it is not essential to plan according to specializations.

In drafting five-year plans for the admission of students, the principal method in calculating the need for specialists is the one that defines the need according to the saturation point of specializations in branches of the national economy and culture. These estimates are carried out simultaneously (for the next five to seven years, and consecutively after that) with the calculation of needs through the classified lists.

There is a strict correlation between these two methods of estimating the need in specialists. It is seen at first in the fact that the classified lists for positions needing more specialists with higher and secondary specialized education allow more accurate definition of the proportion of specialists to the general number of those engaged in branches of the national economy and its probable evolution, since those with higher and with secondary specialized education are considered separately.

Secondly, both methods of estimating the need for the next five years are based on specific indices of the development of each branch of the national economy foreseen in five-year plans, which allows a comparison and mutual co-ordination of available results and makes them more precise by taking into consideration the number of expected graduations of specialists during this period. This permits calculations of the need in specialists, according to the method of saturation, using as a base year the last year of the five-year plan in addition to the year preceding the planned period, for which data is available. All of this ensures greater precision in the calculations.

Thirdly, the close connexion between both methods also becomes apparent in the mutual verification of results. It is equally valid in the following years when a comparison is made with earlier estimates for a definite year according to the method of saturation of specialists and with estimates which now are made for the same year using the classified lists of positions, as well as when earlier estimates for a given year are compared with actual performance. This makes it possible to improve these estimates and to choose more correctly those which will be used in the future.

The calculations of the need of specialists according to the saturation of specialists in branches of the national economy, which are based on forecasts of the proportions of development of these branches and on generalized technical-economic estimates, cannot claim to be as precise as estimates of the need according to specializations. However, they are based on demographic data and the objective laws of the planned development of our economy and culture and give the possibility of defining with sufficient accuracy the need in specialists in larger groups of specializations, which fully meets the needs of those planning their future training and whose problem is primarily to foresee how to provide material, personnel and financial resources for the planned quantity of specialists. The element of chance, as experience has demonstrated, is absent from these estimates. A practical method of calculating the need in specialists by this method for a period of twenty years is described in chapter 6 below.

Estimates of the specialist requirements by percentage of branches of the national economy and culture, as well as those based on the use of classifications of posts to be filled by specialists with higher and secondary specialized education together, ensure that the plans for developing branches of the national economy are closely linked with developing higher and secondary specialized education, and this is the principal advantage which they offer in the context of the planned economy of the USSR.

Section III FRAMING OF PLANS FOR SPECIALIST TRAINING

The plan for the development of higher, and also of secondary specialized, education in the USSR is an integral part of the national economic plan and aims at ensuring specialist training with higher and secondary qualifications in conformity with the long-term requirements in such specialists of branches of the national economy and culture. The calculation of long-term requirements is, as we have already pointed out, the basis for planning their education. Plans for specialist training, especially long-term plans, also attempt to ensure the correct location - corresponding to the distribution of the country's productive forces - of the network of educational establishments, to expand specialist training doing full-time production work, to reinforce - as far as possible - the links between educational establishments and production and practical communist construction; to further strengthen and expand the physical plant of educational establishments, the development of scientific research, and methodological work to provide constant improvement of the quality of the specialists graduated.

Until 1951, plans for specialist training were drawn up by the USSR Ministry of Higher Education and by all the other USSR ministries and departments for the educational establishments under their jurisdiction on the basis of proposals made by these latter. They were included in the national economic plans in the form of general index-targets (admission and graduation) for higher educational establishments subdivided by branches of the national economy and culture and for secondary specialized educational establishments subdivided by the ministries and departments to which they were subordinate. The Supreme Economic Council of the USSR co-ordinated the plans for specialist training for industry, construction and other branches of physical production. The admission and graduation plans were not divided by specialization in the national economic plan. This was done instead by the ministries and departments to which the educational establishments were subordinate within the limits of the total index-targets approved in the national economic plan and on the basis of the proposals of the educational institutions, with due allowance made for their physical plant and staff.

In order to co-ordinate training plans by different ministries and departments under whose jurisdiction the educational establishments came, a new procedure was introduced, starting in 1951, for the framing and approving of plans for specialist training. All the USSR ministries and departments and the councils of ministries of Union republics for the educational establishments controlled by them were obliged to submit draft plans to the USSR Gosplan, which in turn considered these plans. Then the Gosplan worked out, for submission to the government, a composite plan for specialist training which took into account the proposed indices for the development of branches of the national economy and culture of the country and co-ordination in training between USSR ministries and departments and the Union republics.

The 1951 national economic plan was the first to make provision for admission and training of future specialists in higher and secondary specialized educational establishments who were trained as full-time students in specialization groups. Admissions and graduations of specialists from evening and correspondence course educational establishments were, as previously, covered in the USSR national economic plan by a general index figure for each USSR ministry and department and Union republic without breakdown into groups of specializations. Planning by specialization groups only began in 1954.

In that year, plans for training for each specialization were approved by the USSR Ministry of Higher Education in agreement with the USSR Gosplan and the ministries and departments, as well as the Union republics concerned for each USSR ministry; however, after 1955 the plans for specialist training in the educational establishments of the republic ministries and departments began to be approved by the councils of ministers of the Union republics. Plans for specializations were always approved within the limits of the general indices approved by the USSR Council of Ministers.

At present in the USSR, the following procedure operates as regards drafting and approving plans for specialist training (see the introduction to Part Two of the study): the procedure and the deadlines for drawing up national economic plans, including plans for specialist training, are laid down by the USSR Council of Ministers. The indices are uniform and mandatory for all Union republics, ministries and departments. Standard forms for the tables and instructions for completing them when working out current and long-term plans are prescribed by the USSR Gosplan. Annexes XIX and XX show the forms and the model used for the years 1964-65.

The draft plans are drawn up by the ministries and departments having authority over the higher and secondary specialized educational establishments with the participation of the latter and on the basis of their proposals. Draft plans for educational establishments coming under the authority of Union republics and their ministries and departments are submitted to the Gosplan authorities of the Union republics which, after carefully scrutinizing them, frame plans for specialist training for each Union republic and include them in the over-all plan for the development of the national economy. The councils of ministers of Union republics, the USSR ministries and departments, which have higher and secondary specialized educational establishments, submit draft plans for specialist training, along with the national economic plans, to the USSR Council of Ministers. The proposals of the Union republics, USSR ministries and departments are considered by the USSR Gosplan and the USSR Ministry of Higher and Secondary Specialized Education.

The basic indices for the development of higher and secondary specialized education are approved by the USSR Council of Ministers in the state plan for the development of the national economy and in the USSR state budget. The quantitative indices for specialist training in higher and secondary specialized educational establishments are separated in the state plan for each Union republic, USSR ministry and department by groups of specializations and types of training (day, evening and correspondence courses).

A distinction is made between the definite and the estimated indices of the plans for specialist training. Data showing the number of students admitted to the first-year course of educational establishments and the number of specialists graduating are definite, while data on student enrolments represent estimated indices.

The USSR Council of Ministers approves the indices for admission and graduation of future specialists, for the Union republics and USSR ministries and departments having higher and secondary specialized educational establishments, as a general total figure, with a breakdown by groups of specializations and by types of training without indication of specializations. The annual plans for admission and graduation by specializations are approved, within the limits of the general indices set by the USSR Council of Ministers, by the councils of ministers of the Union republics, after consultation with the USSR Gosplan.

The ministries and departments of the USSR and the Union republics, operating within the limits of the plans laid down for them for the admission and graduation of future specialists by specialization and by type of training, approve the plans for specialist training for each of their educational institutions.

In the USSR, therefore, in the context of a planned economy, the framing of plans for the development of higher and secondary specialized education is carried out from the bottom upwards; it begins with the educational establishment and ends with the Ministry of Higher and Secondary Specialized Education and the USSR Gosplan. When the plan has been approved by the Council of Ministers and the Supreme Soviet of the USSR it proceeds from the top downwards, until it reaches each educational institution.

Let us consider the method of calculating the plans for specialist training (number of admissions, graduations, enrolments). The additional requirements in specialists or the graduation figures of future specialists which have to be provided for in each planning year are determined by the method described above.

The plans for admissions to higher and secondary specialized educational establishments, designed to ensure fulfilment of the estimate plan for tne graduation of future specialists, as a whole and by groups of specializations, are drawn up for each type of training, making allowance for the length of the period of study and for drop-outs. Provision is made for the further expansion of all forms of education, the idea being to carry out one of the objectives in our Party programme - to make all forms of higher and secondary specialized education still more generally accessible and to create conditions under which higher and secondary specialized education can be obtained by all those who desire to study. The admission to higher and secondary specialized educational establishments for evening and correspondence courses increased considerably in the past few years and in 1964 represented 56.6 per cent of all the admissions in VUZy, and 48.8 per cent in secondary specialized educational establishments. The graduation of specialists studying without leaving their work formed respectively 43.3 per cent and 43.9 per cent, and the number of those studying, 58.1 per cent and 50.9 per cent (see tables 45 to 47).

From the data shown in the tables we can see a significant increase in the past years in the USSR in the proportion of students studying without terminating work in higher and secondary specialized education institutions. This gave a real opportunity for many young people (in 1964, there were more than 2.7 million persons taking courses in evening classes and by correspondence in VUZy and technicums) to continue their education in higher and secondary specialized schools. This is one of the greatest achievements of socialist construction.

However, we must note that there have been drawbacks. Because of the mass influx of students, an acknowledged lowering of standards on the part of those attending evening and correspondence courses in comparison with those attending full-time school, and also because of an insufficiency in teaching techniques, and for other reasons, the training and the level of knowledge acquired in

Table 45. Admissions to higher and secondary specialized education of the USSR, by type of training (in thousands)

	Higher educational establishments						Secondary specialized educational establishments					
			Training without interruption in work						Training without interruption in work			
Year	Total number of admissions	Regular day-time training	Evening classes	Correspondence courses	Total	Percentage (a)	Total number of admissions	Regular day-time training	Evening classes	Correspondence courses	Total	Percentage (a)
1940	263.4	154.9	6.6	101.9	108.5	41.2	382.9	318.6	12.6	51.7	64.3	16.8
1945	285.7	171.6	4.9	109.2	114.1	39.9	387.6	343.0	9.1	35.5	44.6	11.5
1946	327.2	201.6	4.4	121.2	125.6	38.4	433.8	385.7	8.5	39.6	48.1	11.1
1947	281.1	189.5	4.7	86.9	91.6	32.6	423.3	370.5	8.9	43.9	52.8	12.5
1948	291.8	187.2	6.4	98.2	104.6	35.8	430.9	347.4	12.2	71.3	83.5	19.4
1949	324.3	203.3	6.9	114.1	121.0	37.3	430.0	350.8	13.7	65.5	79.2	18.4
1950	349.1	228.4	9.1	111.6	120.7	34.6	426.3	349.5	15.6	61.2	76.8	18.0
1951	374.4	245.2	10.3	118.9	129.2	34.5	458.5	385.5	20.9	52.1	73.0	15.9
1952	387.3	249.0	11.8	126.5	138.3	35.7	500.0	412.0	28.1	59.9	88.0	17.6
1953	430.8	265.1	16.6	149.1	165.7	38.5	558.0	438.0	48.0	72.0	120.0	21.5
1954	469.0	276.2	22.9	169.9	192.8	41.1	594.8	452.5	57.0	85.3	142.3	24.0
1955	461.4	257.2	28.4	175.8	204.2	44.3	587.5	423.9	54.8	108.8	163.6	27.8
1956	458.7	231.2	32.6	194.9	227.5	49.6	594.6	386.3	78.0	130.3	208.3	35.0
1957	438.3	219.7	34.7	183.9	218.6	49.9	557.3	358.4	71.7	127.2	198.9	35.7
1958	455.9	215.5	42.2	198.2	240.4	52.8	584.1	363.7	75.2	145.2	220.4	37.7
1959	511.7	227.1	63.5	221.1	284.6	55.6	656.2	378.4	98.7	179.1	277.8	42.3
1960	593.1	257.9	77.0	258.2	335.2	56.5	769.3	415.0	130.0	224.3	354.3	46.0
1961	666.9	279.4	93.1	294.4	387.5	58.1	871.1	451.3	139.1	280.7	419.8	48.2
1962	727.5	312.1	102.3	313.1	415.4	57.2	905.6	466.3	141.4	297.9	439.3	48.5
1963	772.4	339.0	118.2	325.2	433.4	56.0	955.0	500.8	146.1	308.1	454.2	47.5
1964	820.5	356.2	117.6	346.7	464.3	56.6	1 038.7	532.2	156.6	349.9	506.5	48.8

a. In proportion to total admissions

Table 46. Number of graduates of USSR higher and secondary specialized educational establishments by mode of training (in thousands)

	Higher educational establishments						Secondary specialized educational establishments					
			Training without interruption in work						Training without interruption in work			
Year	Total number of graduates	Regular day-time training	Evening classes	Correspondence courses	Total	Percentage (a)	Total number of graduates	Regular day-time training	Evening classes	Correspondence courses	Total	Percentage (a)
1940	126.1	97.8	4.4	23.9	28.3	22.4	236.8	205.3	2.5	29.0	31.5	13.3
1945	54.6	48.5	0.7	5.4	6.1	11.1	118.1	105.7	0.5	11.9	12.4	10.5
1946	76.0	66.3	1.0	8.7	9.7	12.8	180.1	161.2	1.2	17.7	18.9	10.5
1947	98.5	85.2	1.1	12.2	13.3	13.5	238.0	219.1	1.8	17.1	18.9	8.0
1948	138.0	119.8	1.7	16.5	18.2	13.2	277.3	249.7	2.5	25.1	27.6	10.0
1949	162.6	136.5	1.8	24.3	26.1	16.0	269.4	233.4	3.8	32.2	36.0	13.4
1950	176.9	145.9	2.0	29.0	31.0	17.5	313.7	279.0	4.7	30.0	34.7	11.1
1951	201.4	165.6	2.8	33.0	35.8	17.8	263.2	228.9	6.2	28.1	34.3	13.0
1952	219.2	172.8	3.0	43.4	46.4	21.2	280.6	248.0	8.0	24.6	32.6	11.6
1953	220.2	168.7	3.3	48.2	51.5	23.4	295.5	264.0	9.5	22.0	31.5	10.6
1954	234.8	170.5	3.9	60.4	64.3	27.4	332.3	299.1	11.1	22.1	33.2	10.0
1955	245.8	179.2	4.6	62.0	66.6	27.1	387.8	345.1	16.0	26.7	42.7	11.0
1956	259.9	185.3	5.7	68.9	74.6	28.7	510.1	448.9	25.2	36.0	61.2	12.0
1957	266.5	186.8	7.2	72.5	79.7	29.9	504.0	434.0	30.8	39.2	70.0	13.9
1958	290.8	205.4	8.7	76.7	85.4	29.4	551.2	463.2	37.5	50.5	88.0	16.0
1959	338.0	240.5	13.2	84.3	97.5	28.9	527.9	396.0	67.1	64.8	131.9	25.0
1960	342.1	227.4	15.5	99.2	114.7	33.5	483.5	348.1	57.9	77.5	135.4	28.1
1961	325.5	204.9	18.1	102.5	120.6	37.1	429.5	285.0	54.0	90.5	144.5	33.7
1962	316.6	195.1	22.5	99.0	121.5	38.4	452.2	290.3	56.8	105.1	161.9	35.8
1963	331.7	200.7	25.9	105.1	131.0	39.5	510.7	288.8	91.1	130.9	221.9	43.4
1964	354.0	200.8	31.2	122.0	153.2	43.3	558.3	313.3	88.7	156.3	245.0	43.9

a. In proportion to total admissions

Table 47. Number of students and pupils in USSR higher and secondary specialized educational establishments, by mode of training (in thousands)

	Higher educational establishments						Secondary specialized educational establishments					
			Training without interruption in work						Training without interruption in work			
Year (a)	Total number of students	Regular day-time training	Evening classes	Corre-spondence courses	Total	Percent-age (b)	Total number of students	Regular day-time training	Evening classes	Corre-spondence courses	Total	Percent-age (b)
1940/41	811.7	558.1	26.9	226.7	253.6	31.2	974.8	787.3	32.2	155.3	187.5	19.2
1945/46	730.2	525.2	14.0	191.0	205.0	28.1	1 007.7	886.0	21.0	100.7	121.7	12.1
1946/47	871.7	636.2	13.3	222.2	235.5	27.0	1 174.5	1 021.1	22.5	130.9	153.4	13.1
1947/48	936.6	690.4	15.2	258.0	273.2	28.4	1 231.6	1 054.1	25.5	152.0	177.5	14.4
1948/49	1 032.1	716.0	18.4	297.7	316.1	30.6	1 264.0	1 058.8	34.7	170.5	205.2	16.2
1949/50	1 132.1	755.9	22.3	353.9	376.2	33.2	1 309.2	1 089.9	44.0	175.3	219.3	16.7
1950/51	1 247.4	817.9	27.2	402.3	429.5	34.4	1 297.6	1 064.5	52.4	180.7	233.1	18.0
1951/52	1 356.1	886.1	32.1	437.9	470.0	34.7	1 368.9	1 136.6	63.4	168.9	232.3	17.0
1952/53	1 441.5	933.6	37.9	470.0	507.9	35.2	1 477.4	1 218.9	81.8	176.7	258.5	17.5
1953/54	1 562.0	994.4	48.3	519.3	567.6	36.3	1 645.5	1 328.0	118.2	199.3	317.5	19.3
1954/55	1 730.5	1 084.1	62.4	584.0	646.4	37.4	1 838.7	1 440.4	163.3	235.0	398.3	21.7
1955/56	1 867.0	1 147.0	80.9	639.1	720.0	38.6	1 960.4	1 469.8	204.1	286.5	490.6	25.0
1956/57	2 001.0	1 177.1	100.8	723.1	823.9	41.2	2 012.2	1 407.3	253.4	351.5	604.9	30.1
1957/58	2 099.1	1 193.1	127.2	778.8	906.0	43.2	1 941.1	1 258.6	281.6	400.9	682.5	35.2
1958/59	2 178.9	1 179.6	153.3	846.0	999.3	45.8	1 875.9	1 125.0	303.0	447.9	750.9	40.0
1959/60	2 267.0	1 145.8	195.8	925.4	1 121.2	49.5	1 907.8	1 066.8	317.9	523.1	841.0	44.1
1960/61	2 396.1	1 156.0	245.0	995.1	1 240.1	51.7	2 059.5	1 090.8	370.2	598.5	968.5	47.0
1961/62	2 640.0	1 204.0	307.0	1 129.0	1 436.0	54.5	2 369.7	1 202.5	431.5	735.7	1 167.2	49.4
1962/63	2 943.7	1 286.8	374.2	1 282.7	1 656.9	56.3	2 667.5	1 309.5	489.5	868.5	1 358.0	50.9
1963/64	3 260.6	1 382.7	439.3	1 438.6	1 877.9	57.6	2 981.4	1 474.2	536.1	971.1	1 507.2	50.6
1964/65	3 608	1 514	506	1 588	2 094	58.1	3 326	1 634	586	1 106	1 692	50.9

a. Beginning of academic year
b. In proportion to total number

evening courses and particularly in correspondence courses in certain educational institutions, do not always provide the qualifications the branches of the national economy expect of specialists.

As a result, in the past two years during the framing of draft control figures for the development of the national economy for the five-year plan (1966-70), discussions have been taking place at scientific and pedagogical institutes, among planning personnel, and in the pages of the press, on how to select the best percentage in specialist training for each type of education. We must assume that in the coming years, there will be no increase in the relative proportion of students studying without terminating work. The solution of this problem will be found once a determination of the best proportions in specialist training for each type of education has been made for each branch of the national economy. Decisions will also have to be made as to the specific organization of the teaching process, the composition of the student body and the qualifications expected of specialists.

In determining the drop-out percentage among students, use is made of the actual figures of drop-out for each type of education (technical, agricultural, etc.) in each type of school over a series of years, with corrections made to compensate for action taken to reduce the wastage.

The number of pupils who drop out from full-time courses in higher and secondary specialized establishments amounts at the present time to approximately 9 to 15 per cent of the number admitted to the first-year course; about nine out of ten persons complete the course at the appointed time. The drop-out percentage differs according to the kinds of education and types of school. In evening and correspondence schools the drop-out is somewhat higher but declines systematically as the system of evening and correspondence course training is further improved, the length of the working day reduced and the material well-being of the people bettered.

Since the periods of training and the drop-out of students vary as between the groups of specializations and individual specializations, admission plans are drawn up also by groups of specializations or even by individual specializations. Estimates of enrolments of pupils for each course of

Table 48. Approximate coefficients of the number of graduates in proportion to total number of students (by year) in higher and secondary specialized educational establishments

Forms of training and types of education	Year: 1	Year: 2	Year: 3	Year: 4	Year: 5	Year: 6	Graduates
HIGHER EDUCATIONAL ESTABLISHMENTS							
Regular day-time classes							
Technical, agricultural, engineering, engineering, economics	0.85	0.91	0.95	0.97	0.99	1.00	—
Humanities							
Five-year period	0.89	0.92	0.96	0.97	0.99	1.00	—
Four-year period	0.90	0.94	0.97	0.99	1.00	—	—
Medicine	0.88	0.91	0.95	0.96	0.97	0.99	1.00
Evening classes							
Technical, agricultural, engineering, economics	0.73	0.81	0.88	0.93	0.97	0.99	1.00
Humanities	0.80	0.85	0.91	0.96	0.99	1.00	—
Correspondence courses							
Technical, agricultural, engineering, economics	0.60	0.70	0.80	0.90	0.97	1.00	—
Humanities	0.73	0.80	0.87	0.93	0.97	1.00	—
SECONDARY SPECIALIZED EDUCATIONAL ESTABLISHMENTS							
Regular day-time classes							
Technical							
Seven or eight-year period	0.88	0.93	0.97	0.99	—	—	—
Ten- or eleven-year period	—	—	0.91	0.97	0.99	—	—
Humanities:							
Economics and public health							
Seven- or eight-year period	0.91	0.95	0.98	—	—	—	—
Ten- or eleven-year period	—	0.93	0.98	—	—	—	—
Education and art							
Seven- or eight-year period	0.91	0.95	0.98	1.00	—	—	—
Ten- or eleven-year period	—	—	0.93	0.98	1.00	—	—
Evening classes							
Technical							
Seven- or eight-year period	0.77	0.84	0.90	0.95	0.99	—	—
Ten- or eleven-year period	—	—	0.85	0.90	0.95	0.99	—
Humanities:							
Economics and public health							
Seven- or eight-year period	0.86	0.91	0.96	0.98	—	—	—
Ten- or eleven-year period	—	—	0.89	0.94	0.97	—	—
Correspondence courses							
Technical							
Seven- or eight-year period	0.62	0.72	0.82	0.90	0.96	—	—
Ten- or eleven-year period	—	—	0.70	0.81	0.90	0.99	—
Humanities:							
Economics and public health							
Seven- or eight-year period	0.70	0.86	0.95	0.98	—	—	—
Ten- or eleven-year period	—	—	0.82	0.91	0.98	—	—
Education and art							
Seven- or eight-year period	0.72	0.80	0.89	0.94	0.98	—	—
Ten- or eleven-year period	—	—	0.77	0.86	0.95	0.98	—

study are made in similar fashion. The number of pupils in higher and secondary specialized educational establishments is calculated at the beginning of each scholastic year for type of school. The planned number of admissions is added to the enrolment at the beginning of the previous year (base year and each planning year) after deducting the probable drop-out of pupils from all courses and those graduated.

For convenience of calculation it is a good idea to convert the drop-out percentage figures into coefficients of those successfully completing training (graduation coefficients) for the whole period of training and separately for each course - something that is essential for estimating the enrolment of pupils. The graduation coefficient is defined as the ratio of the difference between 100 minus the percentage drop-out of pupils of a given course over all the years of training, and 100. For example, if the drop-out for the whole period amounts to 11 per cent of first-year students, then the coefficient of those who complete training successfully will be

$$\frac{100-11}{100} \text{ or } 0.89$$

Table 48 on the previous page shows the approximate coefficients of graduation (converted drop-out percentages) of students of institutes (VUZy) and pupils of technicums.

In framing plans for the development of higher and secondary specialized education, as we have already pointed out, it is essential to work on the basis of the existing physical plant of the educational establishments and realistic prospects for expanding it in the planning period. We shall dwell briefly in this study on the problems of planning the necessary expansion of the physical plant of higher and secondary specialized educational establishments.

Table 49. Standards of technical and material infrastructure in higher and secondary educational establishments

	Total area of school premises in square metres per pupil (a)	
Branch of instruction	Higher education	Secondary education
Technical (industry, building, transport and communications)	10-12	8-10
Agriculture	10-12	8-10
Universities	11-12	—
Teacher training, economics, law and humanities	7-9	5-7
Medicine	6-8	5-6
Physical culture and sport	12-14	10-12
Fine arts	18-20	10-12

a. For the regular day-time schools

The physical plant needed for educational establishments is determined according to the standards laid down for the areas for teaching or work and for space for pupils who live-in, depending on the type of educational establishment, since these standards differ very widely, as table 49 shows.

In addition, a calculation is made of the additional floor space required for research laboratories and, in the case of medical institutes, the floor area of clinics.

The coefficient for converting floor area to cubic content of buildings is taken as 1:5.5 for institutes (VUZy) and 1:5 for secondary specialized educational establishments.

Floor area for student hostels is reckoned at six square metres per student, and should be enough to provide 50 to 70 per cent of students with such accommodation, or in the case of agricultural institutes, 100 per cent. Hostel accommodation is planned for examination periods for pupils studying by correspondence assuming that about 10 to 15 per cent of the enrolment will use a hostel.

The above-mentioned standards are applied in planning new educational establishments and in framing plans for strengthening the physical plant of existing educational establishments and also serve in working out estimates of the capital investments needed for these purposes. Designs for higher and secondary specialized educational establishments in the USSR are produced by the State Design Institute (GIPROVUZ) which comes under the authority of the Ministry for Higher and Secondary Specialized Education.

The floor areas of higher and secondary specialized educational establishments in the USSR at present are somewhat smaller than the standards indicated. In order to make more effective use of school buildings and equipment, lessons are given in a number of educational establishments in one and a half or two shifts.

Section IV

STATISTICAL ESTIMATES OF THE NUMBER OF SPECIALISTS: THEIR AVAILABILITY, DISTRIBUTION AND UTILIZATION IN THE NATIONAL ECONOMY AND CULTURE

Practical experience in studying the requirements and planning specialist training has convinced us that the necessary accuracy in estimating the short-term and long-term needs in specialists and in planning admissions to higher educational establishments can only be ensured if a well-organized statistical record is kept of the specialists available, their distribution and their utilization. Statistics of the higher educational establishments are also needed as well as the number of the population employed in branches of the national economy and culture, the rate at which this changes, and other indices of economic and cultural development.

In the USSR great importance is attached to keeping a statistical account of the fulfilment of the plans for developing branches of the national economy and culture, including figures on the number and apportionment of specialists, the number of students of higher educational establishments classified by course and specialization, of the staffs of professors and teachers in educational establishments, of the physical plant of educational establishments, etc.

Every year, all USSR enterprises, institutions and organizations, on the same date, complete standard statistical forms approved by the Central Statistical Administration (CSA) attached to the USSR Council of Ministers giving details of the number and composition of specialists possessing higher education and, separately, those with secondary specialized education, subdivided under all the specializations taught in educational establishments. Reports are also submitted on the distribution of specialists, according to year of graduation; by industry and, separately, in construction organizations by place of employment; composite reports on the distribution by place of employment of specialists in branches of the national economy and labour with sub-divisions to show generalized groups of specializations and with separate figures for women; composite reports on the territorial location of specialists with higher and with secondary specialized education, including a breakdown by USSR provinces and generalized groups of specializations; reports of the number and educational apportionment of managerial staff and specialists in industrial enterprises, broken down by branches of industry and by generalized groups of specializations.

Similarly, standard statistical forms approved by CSA, in agreement with the USSR Gosplan, the Ministry of Higher and Secondary Specialized Education and other organizations concerned, and with the direct participation of higher and secondary specialized educational institutions, are used annually by all such establishments at a specified date to provide reports showing the position of each higher (and, separately, each secondary specialized) educational establishment at the beginning of the school year - separately for day, evening and correspondence classes. These give particulars of the distribution of pupils by courses and specializations and school year, by their industrial work, sex and age, social standing, and nationality. Information is furnished about the teaching staff, showing posts held and, separately, those who hold the degree of doctor or 'kandidat' or the title of professor and assistant professor; also particulars of the floor area of educational premises, reports from VUZy or technicums for the scholastic year in question giving details on movement of students and the results of examinations. In addition, it is prescribed practice for higher educational institutions of the USSR Ministry for Higher and Secondary Specialized Education to submit a departmental statistical report on admissions and on the results of entrance examinations, separately for regular students and for training given on the job.

We believe that the forms currently in use for higher and secondary specialized educational establishments will be of great interest to the reader; two of them are reproduced in annexes XXI and XXII.

Statistical returns provide ministries and departments having higher educational establishments, as well as planning bodies, with the data required for studying requirements in specialists and planning their training. This work is being continually refined; whenever the need emerges for observing any particular new aspects of higher educational activity the appropriate changes are inserted in the statistical returns.

Section V

PLANNING THE ALLOCATION OF YOUNG SPECIALISTS GRADUATING FROM HIGHER AND SECONDARY SPECIALIZED EDUCATIONAL ESTABLISHMENTS

The provision of employment for young specialists graduating from higher and secondary specialized educational establishments as full-time students constitutes one way of guaranteeing the right of USSR citizens to employment as laid down in article 118 of the USSR constitution. In the context of the planned economy of the USSR with full employment and of training future specialists to meet the requirements of branches of the national economy and culture, a programme for the assignment of young specialists to jobs is the logical continuation of planning their training. Equally, it is an important step in their proper utilization in the specializations they have been taught in educational institutions. In this way, the USSR not only ensures that enterprises, construction entities, kolkhozes and sovkhozes and other organizations and institutions obtain adequate staffs of skilled workers, but - a point of principal importance - demonstrates its concern for the young specialists themselves from the beginning of their employment and provides them with a number of substantial advantages. All young specialists directed to jobs after graduating from an educational establishment are given, before they start work, a month's leave and a grant equivalent to a month's allowance, travel costs for him and his family, and also costs of transporting their property; daily allowances are given for travel time at the rate of a thirtieth of the salary he receives at the new place of employment; if the young specialist needs it, he will be offered living accommodations and also a one-time grant amounting to half his official monthly salary, for himself, with an additional one-fourth for each member of the family accompanying him.

Thus, all the costs connected with the young specialist's establishment in the new place of employment are borne by the State. Another point of importance is that the managers of enterprises and institutions are forbidden to discharge young specialists during the first three years of their employment (while they have not yet acquired sufficient industrial experience) or transfer them to jobs not connected with their specialization. They can only be transferred with the permission of the ministry or department controlling the enterprise, organization or institution in question. Ministries and departments are held responsible for seeing that proper use is made of young specialists in enterprises and institutions under their control.

A number of changes have occurred during the years of the Soviet régime in procedures for drawing up and approving plans for the inter-departmental allocation of young specialists and also for their individual assignment to jobs, as a consequence of modifications in the administrative set-up of branches of the national economy and educational institutions.

In the first five-year period, when VUZy were organized on the branch principle and, with technicums, handed over to the control of economic organizations and of people's commissariats in 1930, those groups assumed the task of allocating young specialists. The Supreme Economic Council of the USSR regulated, directed and controlled the work of the economic bodies and people's commissariats: keeping the general registers of requirements in specialists and of graduates from VUZy and technicums, and drawing up the general plan for placing graduates and deciding the order of such placement.

Placement itself was done by the economic organizations under the direction of the Supreme Economic Council and the people's commissariats, with the participation of the trade unions and the relevant VUZ or technicum. This was done on the basis of a careful selection of graduates and an estimate of the importance of equipping a particular enterprise with young specialists. Special attention was paid to directing young specialists to enterprises situated away from cultural centres.

In their decisions, the authorities gave priority to the needs of economic organizations and people's commissariats controlling VUZy and technicums for such specialists. Economic organs and people's commissariats needing specialists graduating from schools controlled by other bodies made contractual arrangements for the additional specialists with these educational establishments. Young specialists belonging to the indigenous population of national republics were as a rule directed to these republics.

During the Second World War and in the first post-war years, the plan for allocation of young specialists graduating from higher and secondary specialized educational institutions was drawn up by the All-Union Committee for Higher educational matters attached to the USSR Council of People's Commissars (and, after it was reorganized, by the USSR Ministry of Higher Education).

In May 1948, the USSR Council of Ministers adopted a special resolution regulating the allocation and employment of young specialists graduating from higher and secondary specialized educational establishments. It vested the USSR Gosplan with responsibility for planning the allocation of young specialists graduating in specialized subjects, allowance being made for the actual number required by each branch of USSR national economy. Priority was given to the providing of specialists for the most important branches of the national economy.

It was decided that the plan for the allocation of young specialists would be approved, along with the national economic plan, by the USSR Council of Ministers.

Ministries and departments with higher and secondary specialized educational establishments were required to submit to the USSR Gosplan authorities particulars of the number of specialists graduating from higher and secondary specialized educational institutions under their authority by 1 July each year and also to make individual assignments of the young specialists in accordance with the approved plan so that each student would know, three months before graduation, which enterprise would employ him.

All ministries and departments were told to submit annually, not later than 1 September, to the USSR Gosplan authorities applications with justifications for the number they required in each specialization.

It was also decided that the individual assignment of young specialists would be carried out by a commission established by the ministry or department controlling the higher or secondary specialized educational institutions in question. The membership of the commission included: the director of the educational establishment (chairman of the commission), representatives of the ministries (departments) under whose authority the young specialists would come, and representatives of organizations connected with the educational institution. The heads of the faculties concerned and the principal departments were invited to participate in the work of the commissions and also the managers of the enterprises receiving the young specialists, if such enterprises were geographically near the higher educational establishment in question.

The plans for individual assignments were referred for approval to the ministers (heads of departments) under whose authority the educational establishments come. Travel warrants directing the young specialists to jobs were issued over the signature of the minister or his deputy, or of the chief of the relevant administration receiving the young specialists, not later than five days after graduation with an indication of the place of employment, the post, the salary and living accommodation.

Young specialists who have graduated from higher and secondary specialized institutes must work in accordance with their assignment for not less than three years. During this period managers of enterprises and institutions are forbidden to transfer them to jobs unconnected with the specialization they were taught.

Heads of ministries (departments) and of enterprises are held responsible for the proper employment of young specialists in jobs corresponding to the specialized training received by them and also for providing them with the requisite housing and living facilities.

The procedure laid down in 1948 and described above for drawing up and approving the plans for the inter-departmental allocation of young specialists, and also the procedure for their individual assignment, has basically been maintained until the present time. It should be pointed out however that, starting in 1959, the transfer of higher and secondary specialized educational establishments from the authority of Union ministries and departments to that of the councils of ministers of Union republics led to approval of the plan for the inter-departmental allocation of young specialists by the councils of ministers of Union republics in agreement with the USSR Gosplan authorities. Since 1963, individual assignments of young specialists, as a rule, have been made one year before they leave the educational establishments, so as to enable them to get experience in industrial and pre-graduation practical work in the enterprises and organizations where they will be working.

The regulation of the individual assignment of young specialists is done by the USSR Ministry for Higher and Secondary Specialized Education and is mandatory for all USSR ministries and departments, enterprises and organizations.

In the process of preparing plans for allocating young specialists, the higher and secondary specialized educational institutions draw up and submit to the ministries and departments to whose authority they are subordinate on the dates set by the latter: (a) information on specialists graduating from training as full-time students; (b) recommendations on the most appropriate way of directing (all or some) graduates to jobs in specific enterprises, organizations and institutions, in line with the specialized subject they have been taught and the specialization acquired and of their family circumstances, etc.

The ministries and departments having authority over the higher and secondary specialized educational institutions submit the data regarding the young graduated specialists and the proposals for directing them into jobs: in the case of the ministries and departments of Union republics to the Gosplan authorities of the Union republics, and in the case of the USSR ministries and departments to the USSR Gosplan, so that assignment plans can be drafted.

Simultaneously, all the Union republics, and the USSR ministries and departments, submit on the form prescribed by the USSR Gosplan (annex XXIII) data on the additional requirements in young specialists for the planning year.

The data on additional requirements indicates the educational institution of the Union republic, USSR ministry and department from which young specialists should be drawn. This information is also forwarded to the relevant ministries and departments.

The necessary additional young specialists are recruited from graduates of full-time educational establishments and of evening and correspondence course institutes. Priority is given to persons who have been trained in evening and correspondence course schools without interruption in their work.

The USSR ministries and departments and the Union republics consolidate the estimates of specialist requirements of their subordinate enterprises and organizations and use them to plan measures for improving the distribution and employment of specialists, in part by transferring specialists who learned while working to jobs corresponding to the special training and qualifications acquired.

Plans for the distribution of young specialists are worked out for all specializations in accordance with the existing lists of specializations of higher and secondary specialized educational establishments.

Thus, the plans for the allocation of young specialists are framed and approved on the basis of information regarding graduations and notifications of requirements. The plan used in the RSFSR is shown in annex XXIV.

The ministries and departments controlling higher and secondary specialized educational establishments, acting in accordance with the plans for the allocation of young specialists approved by the councils of ministers of the Union republics and other duly authorized bodies and in agreement with the USSR Gosplan, with sufficient notice for individual assignments: (a) supply the ministries and departments which need young specialists with a list of the higher and secondary specialized educational establishments and the number of young specialists who are to be assigned to them listed by skill as well as proposals for their optimal employment, (b) supply relevant educational establishments with a plan for the inter-departmental allocation of their young graduating specialists taking into account their previous proposals submitted.

Ministries and departments receiving young specialists consider within the time limits fixed by the administrative bodies for VUZy and technicums, the proposals for making the most appropriate use of the graduates, and send the schools a list of the places of employment for all young specialists, indicating the names and addresses of the enterprises and institutions, the posts, the salary and housing provided.

The graduating specialists acquaint themselves with this information and choose the job desired. The final decision is made by the commission for individual assignment of the educational establishment concerned. This commission draws up the list of appointment of young specialists using the model shown in annex XXV.

The individual assignment plan for young specialists graduating from each educational establishment is approved by the minister or head of the department controlling the institution, after which the latter transmits a copy to the ministries and departments whose enterprises, organizations and institutions will employ the young specialists.

The ministries and departments return within the approved time limits certificates (annex XXVI) of employment of young specialists in accordance with the individual assignment plan. These certificates are signed by the minister, head of department, or his deputy, and the chief of the appropriate branch administration, who transfer to the educational establishment the money needed to pay for the travel of the young specialists to their place of employment and leave allowance.

Certificates of direction to employment and cash funds are handed to the young specialists not later than five days after they complete their studies. In this way everyone graduating from a higher or secondary specialized educational establishment in the USSR immediately obtains employment corresponding to the specialized training received, the necessary funds for a month's leave, travel costs to the place of employment for himself and members of his family, and an installation grant. The Soviet State does everything to see that all young specialists, as soon as they graduate from training, are incorporated into the general labour force of the Soviet people.

Chapter 5

Financing of education

INTRODUCTION

In any country the development of education depends on the material and financial resources which society allocates to these purposes. The Soviet society's expenditures for education include, first of all, appropriations for the physical plant of educational institutions and their upkeep, which are covered by the state budget, and also the outlays by co-operative and public organizations for those purposes. Society makes a further indirect investment when a large section of the working population is deflected from productive labour during the period of training or education. Furthermore, families contribute their share by paying for the upkeep of those who are studying. All these outlays on education constitute, because of their social and economic effects, essential and appropriate expenditures. In the first place, they produce economic results which can be measured by a rise in the productivity of labour consequent on improvements in the qualifications of workers and the technological advance they achieve, the creation and acquisition of new techniques in production technology and, ultimately, an increase in the national income. In the second place, they ensure the development among Soviet citizens of a political ideology, the formation of Marxist-Leninist outlook on world affairs and of lofty moral qualities, the education of a new type of human being - a matter which is of paramount importance for Soviet society. The economic and social need for, and the advisability of spending public money on, mass education are conditioned by the objective requirements of developing the national economy and satisfying the worker's demands for culture.

Taking an objective view of the laws governing the development of a socialist society and of the role of education in expanding the country's economy and educating a new type of man, the Communist Party and the Soviet government have always allocated a considerable proportion of the national revenue to the all-round development of general secondary, vocational-technical, secondary specialized and higher education in the country.

In the early years of the Soviet régime, when the country had been ravaged by world and civil wars, Lenin wrote in 1923, 'It is essential that, when we make the next review of our quarterly budget, we get down to the business in practical fashion. Of course, the first thing we must do is to cut down the expenditure of other departments rather than of the People's Commissariat for Education, and see that the sums so released are devoted to meeting the needs of the education commissariat ... We are still doing far too little, infinitely too little, to shift the whole of our state budget in the direction of satisfying, first and foremost, the requirements of elementary public education.' In response to the recommendations of the founder of the Soviet State, the USSR government has, since the early years of the Soviet régime, allocated considerable funds from the state budget to education; as the national income has increased, the volume of this expenditure has steadily risen.

Section I SOURCES OF FINANCING EDUCATION

The expenses for national education in the USSR come from the state budget and from contributions of state, co-operative, trade union and other public enterprises and organizations.

The distribution of expenses for national education in the USSR according to sources of financing in 1960 and 1964 is given in table 50.

The data in this table indicate that the financing of education in the USSR comes basically from the state budget, and the relative proportion of expenses from other sources is minor, constituting in 1964, for example, only 7.2 per cent of all expenditure.

Table 50. Expenditures for education according to sources of financing (a) (in roubles million)

Source of financing	1960	1964
State budget	7 843	10 883
Union budget	362	622
Republic budget	2 543	3 277
Local budget	4 938	6 984
Other sources	540	843
Fees for education (b)		
Receipts from parents (c)	393	690
Social security	76	112
Professional unions (d)	10	14
State economic organizations (e)	61	27
Total	8 383	11 726

a. Including expenditures for crèches and for the maintenance of organs of direction (Ministry of Education, central administration of vocational-technical education, and the Ministry of Higher and Secondary Specialized Education)

b. Education is free

c. 'Receipts from parents' shows payments for the maintenance of their children in kindergartens, crèches, pioneer camps, boarding-schools, which partly cover the expenses of these institutions

d. 'Professional unions' shows the expenditures for pioneer camps, and 'State economic organizations' shows also expenditures for pre-school institutions

e. The decrease of expenditures of economic organizations is tied to the transfer of the financing of different pre-school institutions to the state budget

Section II DISTRIBUTION OF EXPENDITURE BY LEVEL AND TYPE OF EDUCATION

The distribution of expenditure by type of education and training, with sources of financing, is shown in table 51. It should be noted that while expenditure for national education and training in the period 1960 to 1964 increased 40 per cent, expenditure for pre-school institutions (kindergartens and crèches) increased 65 per cent; this shows the planned expansion in the USSR in the past few years of institutions for children of pre-school age (up to 7 years of age).

In comparison with the situation in 1940, the expenditure of the state budget in 1964 for general education schools of all aspects went up more than 6 times, for vocational-technical educational institutions, more than 12 times, for secondary specialized educational institutions, 3.7 times, and for higher educational institutions, 5 times. These figures correspond to the rate of growth of all types of education in the USSR for the past quarter of a century. In evaluating this growth of expenditure one must consider that in 1940, before the beginning of the Second World War, our country already had broadly developed the educational system, not only in comparison with the pre-revolutionary period, but with the level reached at the beginning of the second five-year plan, i.e., in 1933. Consequently, expenditures for education were 4.6 times greater in 1940 than in 1933.

The amount of money spent for education and training of children and adolescents, for the general education of adults, and for the training of specialists in the USSR represents 12 per cent of the total expenditure in the state budget, and varies only slightly from year to year.

Table 51. Distribution of current expenditure and capital investment, by type of educational establishment (in roubles million)

Type of education	1960			1964		
	Current expenditure	Capital expenditure	Total	Current expenditure	Capital expenditure	Total
National education-total						
State budget	6 695	1 148	7 843	9 425	1 458	10 883
Other sources	540		540	843		843
Total	7 235	1 148	8 383	10 268	1 458	11 726
Crèches and kindergartens						
State budget	994	112	1 106	1 666	205	1 871
Other sources	377		377	(a) 588		(a) 588
Total	1 371	112	1 483	2 254	205	2 459
Children's homes, school for deaf and blind children						
State budget	269	36	305	291	34	325
General education schools of all types (b)						
State budget	3 143	680	3 823	4 543	831	5 374
Other sources	26		26	60		60
Total	3 169	680	(c) 3 849	4 603	831	(c) 5 434
Vocational-technical educational institutions						
State budget	502	55	557	663	95	759
Secondary specialized educational institutions						
State budget	466	61	527	635	68	703
Higher educational institutions						
State budget	1 000	167	1 167	1 267	183	1 450

a. 'Other sources' for kindergartens and crèches include fees from parents and from economic organizations

b. Including schools for young peasants and workers for which the distribution of the state budget expenses is the following: 1960 (total, 179 million roubles): current costs, 175 million roubles; investments, 4 million roubles. 1964 (total, 302 million roubles): current costs, 297 million roubles; investments, 5 million roubles

c. Including expenses for correspondence schools, boarding-schools and adult education

Section III DISTRIBUTION OF EXPENDITURE, ACCORDING TO TYPE, FOR EDUCATION

Table 52 gives data for expenditures in the USSR for 1960 and 1964, indicating how the money was allocated.

An analysis of the structure of the budgets for general educational schools of all types, vocational-technical schools and factory and works apprenticeship, secondary specialized and higher education shows that the main item is the salaries of teaching staff and auxiliary personnel of educational establishments. In the case of general educational schools, the average state budget expenditure on salaries of teachers and other workers has in recent years amounted to approximately 80 per cent of total outlays, not counting the costs of capital construction, in evening schools for young industrial workers, approximately 91 per cent; in evening schools for young agricultural workers, about 95 per cent; in vocational-technical schools, an average of about 30 per cent (this varies between 29 per cent for trade schools, 33 per cent for technical schools, and 25 per cent for schools for mechanized agriculture); in secondary

Table 52. Breakdown of expenditure, according to type, for national education (in roubles million)

Designation of expenditure	1960	1964
Current expenditures ([a])	7 235	10 268
Administration and general control	38	37
Education		
Wages for teachers and other personnel	3 893	5 577
Other expenses	1 269	1 872
Other current expenses		
Scholarships ([b])	1 992	2 717
Transportation and school canteens	43	65
Capital Investment ([c])	1 148	1 458
Debts ([d])	—	—
Total	8 383	11 726

a. Not including capital investments
b. Included in 'scholarships' are expenditures for other aspects of material assistance to students (meals and clothing)
c. State budget
d. Payment of loans

specialized institutes, about 44 per cent of all expenditure including that on capital construction, and in higher educational establishments, about 36 per cent (see tables 53 and 54). The cost of material assistance (free meals, grants, living quarters and clothing) for the pupils of vocational-technical institutes amounts on the average to about 55 per cent of all costs (this varies between 54 per cent for trade schools, 51 per cent for technical schools, and 59 per cent for schools for mechanized agriculture.) Scholarships in secondary specialized educational establishments and higher educational establishments account for approximately one-third of maintenance costs.

As the USSR national income has increased the outlays on cpaital construction of educational establishments have risen systematically and proportionally, with due allowance for the needs at particular stages in socialist construction. An especially large number of secondary schools were built in the USSR during the first and second five-year plans: in the years 1928-32, new schools for 3.8 million pupils were inaugurated under the state construction plan alone, and in 1933-37 for 5.6 million pupils. In the post-war years, the number of schools built under the state plan and by collective farms was: 2.5 million places in 1946-50; 2.6 million in 1951-55; 4.8 million in 1956-60 and in 1961-64 6.9 million (see table 55). In recent years, the building of schools in the USSR has been greatly expanded. Whereas, during the years 1951-55, the number of new school places amounted to 518,000 annually, in the years 1956-60 it amounted to 958,000 and in 1961-64 to 1,722,000.

The cost of building vocational-technical and secondary specialized educational institutes in the USSR is borne mainly within the framework of capital investment in the branches of the national economy (industry, construction, agriculture, public health, etc.) for which skilled workers are trained. Basically, appropriations from the state budget for branches of education are made only for the construction of secondary specialized

Table 53. Breakdown of expenditure, by basic type, for secondary specialized education according to USSR state budget (in roubles million) ([a])

Type of expenditure	1950		1959		1960		1961	
	Amount	Percentage	Amount	Percentage	Amount	Percentage	Amount	Percentage
USSR State budget-total	442.4	100	523.2	100	527.0	100	552.2	100
Of which:								
Salaries of teaching staff and other workers	158.3	35.8	184.9	35.4	187.8	35.7	206.5	37.4
Grants paid to pupils	163.3	36.9	169.0	32.3	162.9	30.9	163.3	29.6
School costs, for pupils' practical industrial work, scientific research work, purchase of books for libraries	18.9	4.3	28.1	5.4	27.9	5.3	27.7	5.0
Purchase of equipment and inventory items	12.8	2.9	25.0	4.8	26.4	5.0	26.8	4.9
Capital invested in construction	3.8	0.9	8.7	1.7	11.1	2.1	11.9	2.2
Capital repairs of buildings and premises	14.6	3.3	21.2	4.1	24.1	4.6	24.1	4.4

a. Excluding expenses borne by co-operatives, trade unions and Party bodies

Table 54. Breakdown of expenditure, by basic type, for higher education according to USSR state budget (in roubles million) ([a])

Type of expenditure	1950		1955		1959	
	Amount	Percentage	Amount	Percentage	Amount	Percentage
USSR State budget-total	721.1	100	1 020.5	100	1 152.3	100
Of which:						
Salaries of professors, lecturers and other academic staff	326.2	45.2	453.2	44.3	509.0	44.2
Grants paid to students	233.4	32.3	361.5	35.4	354.5	30.8
School costs, for students' practical industrial work, scientific research work, purchase of books for libraries	30.4	4.2	46.1	4.5	62.7	5.5
Purchase of equipment and inventory items	34.0	4.7	20.5	2.0	37.1	3.2
Capital invested in construction	27.5	3.8	55.4	5.4	81.1	7.0
Capital repairs of buildings and premises	17.0	2.4	18.3	1.8	27.7	2.4

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a. Excluding expenses borne by co-operatives, trade unions and Party bodies

Table 55. Entry into operation of primary, seven-year, eight-year and secondary schools, including boarding-schools, in the USSR from 1918 to 1961-64

Year	State and co-operative enterprises and organizations		Kolkhozes		Total	
	Number of schools	Number of places ([a])	Number of schools	Number of places ([a])	Number of schools	Number of places ([a])
1918-28	7 780	1 061	—	—	7 780	1 061
First five-year plan (1929-32)	13 128	3 771	...	...	...	...
Second five-year plan (1933-37)	18 778	5 576	...	...	...	...
Three years of third five-year plan (1938-40)	5 325	1 593	...	...	...	...
War years (1941-45) ([b])	8 412	1 177	...	...	...	...
Fourth five-year plan (1946-50) ([b])	4 345	1 181	14 193	1 288.5	18 538	2 469.5
Fifth five-year plan (1951-55)	5 819	1 912	5 808	679.1	11 627	2 591.1
Sixth five-year plan (1956-60)	9 510	3 175	13 728	1 600.1	23 238	4 775.1
1961-64	11 413	5 102	11 856	1 789	23 269	6 891

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a. In thousands
b. Including reconstruction only of the schools completely destroyed during the war years. In addition, a large number of partly destroyed schools were rebuilt

institutes of education and culture. This is the reason for the relatively small volume of these capital investment costs for secondary specialized institutes in the State budget.

For the period from 1950 to 1959, capital investment for the construction of higher educational establishments under the State plan rose from 27.5 million roubles to 81.1 million roubles, or almost three times. Furthermore, considerable funds - especially for building evening and correspondence course institutes, faculties and departments - are allocated out of capital investments in industry, construction, agriculture, public health and other branches, and also by co-operative and trade union organizations and Party organs.

Section IV

DRAFTING OF THE EDUCATION BUDGET

The determination of the amount to be expended on education in a planning year is effected simultaneously with the draft plans for the development of each branch of public education and by the same procedure, 'from the bottom upwards', from the educational establishment to the USSR Ministry of Finance. Each educational establishment prepares an estimate of expenditure which constitutes the basic document setting forth the over-all amount, specific purpose and quarterly allocation of the budget appropriations required for maintenance. The total expenditure and its distribution by types of outlay, or as it is usually termed, by items, is set out in juxtaposition with the plan for the preceding period and its fulfilment. The estimate is supported by calculations fixing the amount to be expended on each item. These are compiled on the basis of the draft plan for admissions, graduations, and enrolment of students, and also in conformity with current legislation on the salaries payable to teaching, administrative, auxiliary and other staff (including the personnel of student hostels), on the grants to students and on the amounts expended on free meals and clothing, and are made in conformity with the expenditure norms for individual types of costs.

The amount of the expenditure as a whole and for each item in the estimate depends, basically, on the number of pupils enrolled and the kind of training given them.

The number of teaching staff required is calculated by applying the student/teacher proportion observed in the various educational establishments. The standards used in calculating the number of teachers in schools of general education have been described in the section dealing with determining requirements in teachers.

In USSR higher educational establishments, for instance, the following standards are used in calculating the teaching staff; they vary according to the particular groups of VUZy and specialist training faculties. The number of students per teacher in engineering schools with full-time education is 12.14, in evening classes 20, and in correspondence courses, 50. In economic engineering and economic institutes the numbers are 14.04, 21 and 53, respectively; in universities, 10.02, 20 and 53; in agricultural institutes, 10.96, 20 and 53; in teacher-training schools, 11.14, 20 and 58; in medical schools, 9.16, 16 and 30; in art academies, 4.68, 6 and 18; in physical culture and sports academies, 8.4, 14 and 40 students per teacher. Furthermore, USSR ministries and departments and those of Union republics are allowed to fix the standards for VUZy under their control with variations, in the case of evening classes, of plus or minus 2, and in the case of correspondence courses, of plus or minus 3, subject to the standard being observed as a whole in the particular ministry or department.

The volume of expenditure for payment of grants to students depends, of course, on the number enrolled, the prescribed rates of grants and the percentage of students covered. The reason for the large amounts expended on grants to students is that in the USSR provision is made for all grades of workers to obtain education right up to university level. State grants are provided for the overwhelming majority of full-time students of vocational-technical institutes, secondary and higher educational establishments, if justified by the progress made and their material circumstances. The same is true for students of the senior classes of evening and correspondence courses of higher and secondary specialized educational establishments when they sit for examinations and present their diploma theses. In 1963, for instance, grants from the state budget were received by one million students of higher educational establishments and more than one million of secondary specialized educational establishments, i.e., 72 per cent of the total number of full-time students. In addition, a further 15 per cent of the full-time students were receiving scholarships from enterprises, building sites or kolkhozes and sovkhozes.

The provision of grants for students, plus free education, represents an enormous achievement of socialism for it creates the necessary conditions enabling all who so desire to receive education, irrespective of their social status and material circumstances.

In chapter 2 of Part Two we explained the methods of establishing estimates and the order of financing of secondary general education schools. Below are the methods of drafting the budget and the order of financing secondary specialized educational institutions.

These institutions are under the jurisdiction of the ministries and departments of the USSR and the Union republics as well as their local organs and the executive committees of the soviets of workers' deputies, and are financed from the state budget. The expenditure for maintenance of these establishments is determined by the estimates for the corresponding year.

The estimates include the following budget classifications: Article 1: 'Wages'; 2: 'Extra wages'; 3: 'Administrative and maintenance costs'; 4: 'Missions and travel'; 5: 'Expenditures for the industrial training of students, scientific research work and books purchased for libraries'; 8: 'Scholarships'; 10: 'Purchase of medicaments and first-aid material'; 12: 'Purchase of equipment and furniture'; 14: 'Purchase of accessories'; 15: 'Capital investment for equipment'; 16: 'Capital repairs of buildings and structures'; 18: 'Other expenditures'.

The allocation of estimates for each article is determined by the average annual contingent of students and the average annual number of groups in an educational institution. The annual contingent of students is the arithmetic average of students who change classes at the beginning and at the end of the planned year. This is determined according to the admission of students at the beginning of the planned year plus one-third for new admissions (since admissions take place on 1 September, the new students will be maintained for only four months or one-third of the year), minus one-half of scheduled graduations (if the graduation takes place on 1 July) and the anticipated elimination or drop-out of students through the year.

As the draft budget for the planned year is established in the middle of the previous year, the calculations are made in the following manner (taking 1966 as an example):

1. Number of students on 1 July 1965: 2,100
2. Plan of admission of students for 1966: 700
3. The anticipated drop-out of students in the second half of 1965: 28
4. The contingent of students for 1 January 1966 (lines 1 + 2 − 3): 2,772
5. Plans of admission of students for 1966: 900
6. Plan of graduation of students for 1966: 590
7. Anticipated drop-out of students for 1966: 62
8. The contingent of students for 1 January 1967 (lines 4 + 5 − 6 − 7): 3,020
9. Average annual contingent of students for 1966: 2,896

The average annual number of groups necessary for calculating the wages of teaching personnel is the sum of the following items: the numbers of groups at the beginning of the planned year multiplied by the period of teaching in months and the number of groups at the end of the planned year multiplied by the period of teaching in months and divided by twelve. The starting point is the number of students in each group, usually thirty persons.

The calculation of the average annual number of groups follows the sample below:

1. Number of groups on 1 July 1965: 50
2. Number of groups admitted in 1965: 23
3. Expected number of groups on 1 January 1966 (lines 1 + 2): 73
4. Number of groups to be admitted in 1966: 30
5. Number of graduating groups in 1966: 20
6. Expected number of groups on 1 January 1967 (lines 3 + 4 − 5): 83
7. Average annual number of groups in 1966 (73 x 8.5 months + 83 x 3.5 months) ÷ 12: 76.

For the calculation of the average annual number of groups, the duration of study groups, entering at the beginning of the planned year, is estimated at 8.5 months; groups entering at the beginning of the following year are estimated at 3.5 months, because the wages for the second half of December (i.e., from 16 December to 1 January) are calculated and are paid out of the following year's budget.

Wages. The planning of expenditures for wages of the teaching staff, assistants, administrative and service staff, is derived from the total wages for all these workers, which are set by law. The rate of wages of teachers of secondary specialized educational institutions is based on length of service (up to five years, from five to ten years, from ten to twenty-five years, twenty-five years or more) the subject taught (general education or specialized) as well as the location of the educational institution (in the city, workers' quarter, or in rural districts).

It is based on three hours of teaching a day (720 hours a year, since there are 240 working days a year). If the teacher has a heavier teaching load, the wage is raised in proportion to the additional hours. Thus, for example, the salary of a teacher, possessing higher education, in a secondary specialized educational institution, with more than twenty-five years' experience, is 137 roubles a month, and with ten to twenty-five years of teaching experience, 100 roubles. Moreover, a teacher in a secondary specialized educational institution receives additional compensation: for the correction of written work in Russian, native language and literature, 10 roubles monthly; for mathematics, 8; foreign languages, draughting and applied mechanics (construction), 6; for the supervision of planning offices and laboratories, from 12.50 to 17.50 roubles a month, depending on the volume of work; for the presidency of various pedagogical methodological commissions, from 10 to 17.50 according to the volume of work and the importance of the subject. When a secondary specialized educational institution has no official librarian, the teacher who undertakes this task receives approximately 10 roubles a month.

The same wages and conditions apply to teachers in vocational-technical institutions.

The salaries of administrators in secondary specialized educational institutions (directors, assistant directors, managers of departments and affiliates, head accountants) are determined by their length of service (except for assistant-directors for administration and finance whose salaries are independent of their educational experience) and the number of students. Thus, for example, a director of a branch school (annex) with 1,121 to 1,360 students who has ten to twenty-five years of service, receives a salary of roughly 165 roubles a month; if the number of students exceeds 1,360, he is paid 175 roubles a month.

For salaries of secondary specialized educational institutions under a given ministry or department, the calculation is based on the average annual number of positions and the average monthly wages for teachers.

The average annual number of positions is based on the number of positions actually occupied according to the last report preceding the planning period or budget examination. Taking into account possible changes in the volume of work in technicums, which may require increased personnel, the quantity of positions at the end of the planning year is determined, and the average during the year is calculated on the basis of the number employed at the beginning and at the end of the year.

The average monthly wage rate of a teacher is determined on the bases of the regular schedule in secondary specialized educational institutions and of reports on the use of the wage fund for the preceding year.

In planning the expenditures for wages, besides the above calculations, social security fees are added. (The percentage is established by trade unions to which the personnel of secondary specialized institutions belong.)

Scholarships. The planning for student scholarships in secondary specialized educational institutions takes place in accordance with the quantity and procedures set by the government of the USSR. The size of the scholarship fund is based on the number of students, the percentage of those receiving scholarships, and the average size of the scholarship per month. The average scholarship for a student of secondary specialized educational institutions is twenty roubles a month; and three out of four students receive these grants.

In the case of temporary absence (illness, care of a sick member of the family), students of secondary specialized educational institutions receive full scholarship payments for the length of time envisaged by existing legislation for social security.

Teaching. The planning of the educational expenditure of secondary specialized educational institutions, which includes current expenses (the acquisition of educational materials, the maintenance of laboratory animals, class journals, diplomas, etc.), outlays for industrial training of students, and the purchase of books for libraries, is based on the average expenditures for one student, in line with corresponding data from previous years. The average expense per student is roughly four roubles a year.

Industrial training of students affects the budget of enterprises and institutions where the students undertake the training as well as that of secondary specialized schools. Enterprises and institutions not only provide working space and equipment, instruments and materials, but recruit and pay instructors and guarantee students' housing and meals. For housing, the students pay a maximum of 0.50 roubles a month and for the use of bedding, 0.20 roubles. Secondary specialized educational institutions pay students for travel to and from the place of industrial training and daily expenses, and for the instructors who accompany them to direct their training, per diem payment, and housing and travel expenses in accordance with legislation for the payment of service trips.

Planning of these expenses is conditioned by the time allocated for industrial training by the education plan, the number of students involved and the cost of their trip to the place of training.

When these plans are made at the level of the ministry, or the department, that is, when the budget is drafted, the number of training days per person is multiplied by the average expenditure per person per day. The average expenditure is derived from data from the preceding year.

Expenditure for the acquisition of books and other publications for libraries is determined on the basis of existing funds and the necessity to provide students with the literature they need, according to established standards for one student; on the average, roughly 2.50 roubles a year.

Administration and maintenance. The planning of administration and maintenance expenses for secondary specialized educational institutions (expenditures for the acquisition of office accessories, communications, rent, heating, lighting, water, the maintenance of buildings, yards and streets, and of transport, the acquisition of medicaments and first-aid equipment, etc.) are estimated per student, per square metre of building area, per heating unit, etc.

Missions and service travel. Expenditure for missions and service trips is based on the number of missions, their duration and the actual cost of the trip, as well as the current rate of daily and lodging expenses.

Furnishings for communal housing. The planning of expenditure for the acquisition of furnishings for residences of secondary specialized educational institutions follows established cost and material standards for new places, or for completing existing residence.

Secondary specialized educational institutions as state institutions financed by the state budget do not, as do enterprises and organizations, include amortization in their calculations of capital repairs.

Building and equipment. Expenditure for capital repairs of buildings of secondary specialized educational institutions is included in budget estimates. Its volume is determined by data concerning the condition of the schools and other relevant places, and the necessity of repair work (estimates of costs, lists of needed work, etc.).

During this planning, over-all estimates of secondary specialized educational institutions of a given ministry are made on the basis of the cubic volume of the buildings, the cost of restoring one cubic metre (approximately fifteen roubles) and the norm for amortization (approximately 2 per cent) determined by the government.

Other expenses. Among other expenses calculated in the estimates for secondary specialized educational institutions are those for the organization and direction of collective cultural activities (lectures, excursions, clubs, etc.) and sports among students, the maintenance of residence and the renting of rooms to students. The standard for one student per year is approximately 2.50 roubles, for collective cultural and physical education activities, 12.40 roubles for communal housing, and thirty roubles for rent.

School equipment and furniture. The quantity of funds for the acquisition of school equipment and furniture takes into account the established norms for each student and the inventory of each technicum, including its state of repair. Expenditure for the acquisition of study equipment which does not cost more than two roubles per item, and items which will last less than a year regardless of their cost, are not counted in this inventory. They are included in other parts of the budget, namely office and administration expenditure, teaching expenses, and other. If the acquisition of furnishings and equipment comes from the budget for equipment, the expansion and reconstruction of buildings is included in the budget assigned for construction.

Construction. The allocations for construction are based on standards which guarantee students a study and living area, and on the planned increase in the number of students, and must refer to definite construction projects, which are accompanied by technical documentation following accepted forms.

These in brief are the methods for the planning of expenditure for secondary specialized educational institutions. Expenditure for vocational-technical and higher educational institutions is planned in a similar fashion.

On the basis of the expenditure estimates submitted by educational establishments, the budget appropriations, for instance, which are needed for the maintenance of general educational schools of all types are calculated by regional, urban and provincial boards of public education ('rono', 'gorono', oblono') and by the education ministries of autonomous and Union republics, and are submitted to the finance ministries of the corresponding republics; in the case of vocational-technical schools, they are calculated by the State Committee of the Council of Ministers of the USSR for vocational and technical education of the USSR Gosplan and its territorial administrations, and submitted to the USSR Ministry of Finance; in the case of secondary specialized and higher educational establishments, by the USSR and Union republic ministries and departments to which they are subordinate, and submitted respectively to the USSR Ministry of Finance or the finance ministry of the Union republic concerned. In ministries and departments which have educational establishments and also in ministries of finance, there are special administrations or sections which deal with the problems of financing education. The USSR Ministry of Finance, for instance, receives from all Union republics and USSR ministries and departments estimates of the budget appropriations needed for education and on that basis, and in close conformity with their development planning indices, draws up the draft state budget for the USSR, with breakdown by Union republics and USSR ministries and departments. This work is carried out in close liaison with the USSR Gosplan and the interested organizations.

After the state budget has been approved by the USSR Council of Ministers and by a session of the Supreme Soviet of the USSR (in the case of a Union or autonomous republic, by the council of ministers and supreme soviet of the republic), the expense estimate of each educational establishment is approved by the next higher organization (ministry, department, provincial board of education, etc.) within the limits of the appropriations allocated to it, on the dates laid down by the government, and in the case of educational establishments maintained by local budgets, on the dates fixed by the executive committees of councils of workers' deputies. The estimate is drawn up every calendar year on forms prepared by the Ministry of Finance of the USSR and is approved in duplicate, one copy being sent to the educational establishment, while the other copy is held by the chief controller, thus ensuring allocation of funds at the proper time and supervision of their utilization. Each educational establishment is thus provided with finance for the next budgetary year, which in the USSR corresponds to the calendar year.

Conclusion

Expenditure for education in the USSR increases every year. Thus in the 1966 budget, allocations for social and cultural measures increased in comparison with 1965 by 2,800 million roubles, or 7.7 per cent. Of these allocations, education, science and culture accounted for 18,700 million roubles, or 17.8 per cent of the total state budget.

General secondary education in 1966 was assigned 5,000 million roubles, an increase of 6.4 per cent over 1965. The total number of students in general educational schools of all kinds was to reach 49 million in 1966. Of that number, 3 million students or 590,000 more than in 1959 were to attend extended session schools and classes.

For the preparation of skilled personnel in vocational-technical secondary specialized and higher educational institutions, 3,300 million roubles, or 8.5 per cent more than in 1965, were allocated in 1966.

To appreciate the importance of these expenditures for national education, science and culture, in comparison, we note that allocations for defence in the same budget were only 13,400 million roubles, 12.8 per cent of all expenditure, as opposed to 17.8 per cent for education, science and culture. This bears witness to the high importance the Soviet government gives to education.

In addition to appropriations for social and cultural measures, there were substantial credits from state, co-operative, trade union, and other enterprises, as well as kolkhozes. Thus, in 1964 the total outlays for social and cultural measures were 21 per cent of the national income.

Money spent for education is both necessary and advisable. It is difficult to overestimate its effect, which is to raise steadily the general level of education of the population, develop the cultural and technical competence of workers and peasants, bringing them closer to the level of workers in engineering-technical work. On the size of these expenditures in a large degree depends the growth of industrial strength, the progress of technology, the organization of industry, the raising of the general activity of workers, and the progress of Soviet society towards communism.

Money spent by the Soviet State for education is richly compensated. In one of his books, S.G. Strumilin, the academician, writes that estimates in 1924 of the costs of the proposed reform in primary education involving an expansion of the number of pupils over ten years from 4 to more than 8 million came to 1,622 million roubles. But the rise in national income resulting from the higher qualifications acquired by the school children taught during those years amounted, after only five years, to more than 2,000 million roubles, more than covering all the costs incurred.

According to Strumilin, the total national income of the USSR in 1960 was 146,600 million roubles, of which 33,700 million - or 23 per cent - represented the proportion of the income resulting from increased skills. Such is the effect on the national economy of education in the USSR.

Chapter 6

Prospects for the development of education

Since the time when, under the leadership of the CPSU, the Soviet people began to construct a communist society, the organic connexion between plans for the development of the national economy and plans for the development of education has assumed even greater importance.

The Soviet people have been in the process of solving two historical problems - creating the physical and technical bases of communism, and forming a new type of human being. In fact, this is essentially a single process and any delay in educating and training Soviet people will inevitably slow up the building of communism.

In the new CPSU programme for the construction of communism in the USSR, which was adopted in 1961 at the twenty-second congress of the CPSU, one of the basic tasks in the field of education and training was to implement universal and compulsory complete secondary education. Within the present decade, compulsory secondary general education and polytechnical education are to be available for all children of school age, and eight years of schooling for those young workers who do not possess a requisite education. In the next ten years, the goal is to provide an opportunity for everyone to receive complete secondary education.

In achieving the objective of universal and compulsory secondary education, an enormous role devolves on secondary specialized educational establishments. These schools provide education which can go on from the instruction given in eight-year schools, and, for certain specializations, in complete secondary schools. Thus, the secondary specialized schools constitute one of the forms of complete secondary schooling at the second stage.

In the section of the CPSU programme dealing with education, it is pointed out that 'As scientific and technological progress advances there will be a further expansion of higher and secondary specialized education, the purpose of which is to prepare highly qualified specialists possessing a wide theoretical and political outlook on affairs.

'Shorter working hours and a considerable rise in living standards will produce conditions enabling everyone who wishes to study to obtain higher or secondary specialized education. In all regions of the country, and with the support of enterprises, trade unions and other public organizations, there must be an expansion of the network of higher and secondary specialized educational establishments, particularly of evening and correspondence course institutes, and also of factory technical schools (VTUZy), agricultural institutes based on larger sovkhozes, people's universities, studios, conservatories, etc. It will be necessary to make considerable annual increases in the enrolment of pupils in higher and secondary specialized educational establishments. Tens of millions of people are going to be given specialized education.'

While directing its efforts towards implementing universal secondary education, the Communist Party simultaneously set itself the objective of making all forms of secondary specialized and higher education still more accessible. By 1980 it is proposed to raise the number of students in higher educational institutions to 8 million, that is, more than three times what it was in 1960, and also to cause the rate of development of secondary specialized education to outstrip higher education, in such a way as to increase considerably the number of specialists with secondary qualifications as compared with those with higher education.

The targets for educational development, including higher and secondary specialized education, in the USSR for the next twenty years, fixed by the twenty-second congress of the CPSU, are organically linked with the plan for creating the physical and technical bases of communism. The new CPSU programme has framed a scientifically based, more definite working plan for the construction of communism; deadlines are set, economic estimates made and methods proposed for solving the problems involved in the building of communism.

The need for this major expansion of secondary general, secondary specialized and higher education in the next twenty years derives from the fact that technological progress considerably heightens the demands made on production training, on the specialized and general education of all workers; what is more, the socialist system of planned economy links the acceleration of technical progress with full employment of the entire able-bodied population.

The characteristic features of the process of perfecting existing enterprises and developing them into enterprises of communist society include: new forms of technology, a high level of organization, combined with increasingly fuller automation of manufacturing processes and the introduction of automation into the sphere of administration and control; higher cultural and technical qualifications in workers, an ever-greater degree of co-ordination of physical with intellectual efforts, and an increase in the proportion of engineers and technicians on the staffs of enterprises.

We would like to emphasize the last postulate, since the process of increasing the proportion of engineers, technicians, and specialists generally reflects the most typical trend in the structure of industry and agriculture. This process, like that of diminishing the proportion of poorly qualified workers, as we have already had occasion to observe, is constantly going on in the national economy of the USSR.

The labour of workers and collective farmers is coming to resemble more and more that of engineers, technicians, agricultural experts and other specialists. Even today, workers in socialist production are expected to be able to handle modern lathes, the most delicate measuring or verifying instruments and appliances, and to understand complicated technical calculations and drawings. The possibility of developing the country in the technological and economic sense presents all workers in our society with increasingly higher demands. The leading type of industrial worker in the near future will be the one whose principal function it will be to control systems of automated machinery and mechanisms, to assemble, adjust, regulate and repair them. In order to perform these functions, he will need to have production skills of a relatively all-round nature as well as specialized knowledge.

In agriculture, just as in industry, the principal figure will be the highly qualified worker with a command of the scientific principles of farming and stock-raising, the operation and repair of machinery, the electrical and chemical aspects of agricultural production, in other words, a man with specialized training. With the gradual development of these processes will come an ever-increasing demand for specialists and a gradual obliteration of the essential differences between intellectual and physical labour.

The transition to communism and the realization of the basic principle, 'From each according to his ability, to each according to his needs', make the people more conscious of the fact that the labour of each member of society should be more productive, that each should do his utmost. An all-round education for all members of society, becomes a vital necessity and requirement. This can be achieved only by the continuous development and improvement of education.

When the CPSU programme was being prepared, economic calculations were made for all the development indices of the USSR national economy and culture for the next twenty years. We shall dwell briefly here on the technical and economic targets which determined the rates fixed for educational development, including higher and secondary specialized education, for the period up to 1980.

The CPSU programme plans to augment the volume of industrial production during the present decade approximately two and a half times, and by 1980 not less than six times. This would surpass by far the total volume of present industrial production in the United States of America. In order to carry out this task it will be necessary to increase the volume of industrial production by an annual average of 9 to 10 per cent. Productivity of labour in industry during the first ten years would be raised more than twofold, and over twenty years four or four and a half times, i.e., by an annual average of 7 to 8 per cent.

Economic calculations showed that if the level of labour activity achieved in 1960 were maintained, about 150 million people would be required to reach the sixfold increase but, with the planned increase in labour productivity, less than 40 million people would be required to do so.

In the long term the intensive development of industry will call for large-scale progressive changes in its structure; there will be, more especially, a growth in the role of such branches as chemistry and electronics where technological progress is most rapid; provision will be made to step up the rate of electrical power output so that workers in the years immediately ahead will be equipped more generously with electrical appliances. The development of mechanical engineering will be greatly accelerated as a basis for the technological re-equipment of the entire national economy.

During the current decade in the USSR, increased electrical resources and the development of mechanical engineering will bring comprehensive mechanization of industry, agriculture, construction, transport and communal services; and in the following decade the comprehensive automation of industry on a mass scale will be accomplished with a transition in ever-greater measure to automated shops and enterprises ensuring a high standard of technical and economic effectiveness.

Automation and comprehensive mechanization will change radically the character of labour, will form the basis of a gradual transformation of socialist labour into communist labour and a steady increase in productivity.

This increase in productivity constitutes one of the basic tasks of communist construction. It can be achieved only by means of more complete electrification of the country and the improvement of the techniques, technology and organization of public production in industry and agriculture; by comprehensive mechanization of production processes and automating them more completely; by making wider use of chemicals in the national economy; by developing in every possible way new types of power and materials; by the all-round and rational utilization of natural resources; by an organic combination of science and production and by accelerating scientific and technological progress. All of this calls for a systematic rise in worker's qualifications, and for the systematic training, education and rational employment of workers who will be released by certain industries to move over to other operations with higher labour productivity or to other branches of the national economy and culture. Full employment of the able-bodied population constitutes the immutable law of the socialist system. High productivity will continue to be achieved in the USSR, in conjunction with full employment of the able-bodied population, to reduce further the working hours and the work week, and to increase absolutely and proportionally the number of persons engaged in service industries such as education, public health, science and science research, trade, restaurants and other branches serving the cultural and daily needs of the population.

Estimates of the probable annual average number of workers and employees in the national economy show that in the next twenty years there will be a considerable rise in the USSR in both the absolute and the relative numbers employed in those service industries. While the total number of workers and employees engaged in the national economy will rise 50 per cent, the total number of workers in industry, construction, agriculture and forestry, transport and communications will increase by only about 18 per cent. At the same time, the number employed in education, public health, science and science research, trade, restaurant and housing services will have risen in 1980 by about three times as compared with 1960. Such a rise is made necessary by the rapid development during the period of communist construction in our country of branches serving the needs of the population. The possibility of achieving such a radical change in the employment structure of the USSR is created by the considerable increase in labour productivity, especially in material production, as a result of the introduction of the most up-to-date inventions of science and technology and the mechanization and automation of production processes.

The change in the direction of increasing the proportion of people employed in service industries, which demand a heavy percentage of specialists, demonstrates the need for considerably expanding specialist training. For instance, the growth in the number of persons employed in education and in cultural institutions has caused a corresponding increase in the number of specialists with higher and secondary specialized education in such establishments. In 1960, there were in the USSR 2,445,000 specialists, or 2.6 times more than in 1940.

Fulfilment of the targets laid down in the CPSU programme for the education of the new man, the communist man, will require a further considerable increase in the number of specialists with higher and secondary specialized education employed in educational and cultural institutions. According to tentative calculations, the number of teachers and educators in general educational schools, boarding-schools and extended-day-care schools will have to be increased in the next twenty-year period by 150 per cent.

Allowance was also made in the estimates for a steady increase in the proportion of specialists to the total number of workers, especially in production branches. Drawing on the experience of enterprises and organizations that are technically and economically progressive, plans were made to increase the number almost threefold over twenty years, on an average, by raising to 1:4 the ratio between specialists with higher and those with secondary specialized education. In agriculture and forestry, the increase would be about tenfold, with approximately five specialists with secondary specialized education for every one with higher education. In branches such as public health, education, science and science research and in the staffs of state administrative departments which already have a high percentage of specialists, it is proposed to have only a few more specialists for every thousand workers than there were in 1960.

To meet these goals, despite the probable growth of population, the natural losses of specialists, and full employment, it was planned, as already pointed out, to increase the student enrolment in VUZy to about 8 million during the next twenty years, i.e., 230 per cent as compared with 1960, and ensure the graduation of tens of millions of specialists with higher and secondary specialized education. In 1980 about one to 1.1 million specialists with higher education will graduate in the USSR, as against 343,000 in 1960.

The further expansion of education in the USSR, including higher and secondary specialized education, is necessary not only because the national economy needs specialists but also because all members of communist society must receive adequate education. By the end of the planning period the number of students of higher educational establishments in the USSR (allowing for the growth in population) will rise to 280-290 per 10,000 inhabitants, or 2.6 times more than in 1960. It should be observed in this connexion that in 1960 the USSR already had 111 students in VUZy for every 10,000 inhabitants, or more than in any other country in the world. It is proposed to expand specialist training in secondary specialized educational establishments at an even faster rate and to provide universal secondary education for all school-age children. As tentative calculations have shown, by the end of the long-term planning period, every fifth worker employed in the national economy of the USSR will have had higher or secondary specialized education, and the rest of the able-bodied population will have received general secondary education and broad industrial qualifications.

During the first five years of this programme for the construction of communist society in the USSR, the targets for educational development have been reached with success. It is sufficient to note that the number of students in general education schools of all types has increased from 36.2 million to 48 million, or 33 per cent; the number in vocational-technical education and industrial apprenticeship, from 1.1 million to 1.31 million, or 18 per cent; the number in secondary specialized institutions, from 2.06 to 3.57 million, or 73 per cent; the number in higher education, from 2.4 million to 3.83, or 60 per cent.

These are the achievements, briefly summarized, of the first five years of the plan for the development of education in the USSR, foreseen by the CPSU programme.

In 1965, preparations began in our country on the new five-year plan for the development of the national economy for 1966-70. In February 1966, the plenum of the Central Committee of the CPSU examined and approved the draft directives of the twenty-third congress for the five-year plan. The drafts were published in the press, and according to the tradition in our country were the object of wide public discussion.

After confirmation of the directives was made by the party congress, held in March 1966, the new five-year plan was set up.

Further educational development is foreseen, as well as an increase of the general educational level of the population, and the quality of skilled worker training. During the 1966-70 period it is expected that the compulsory general education of youth on the secondary level will have been generally accomplished; the number of students in extended day education will increase more than two times, and the number of schools for young workers and peasants more than 1.4 times.

Skilled worker training for all branches of the national economy is also contemplated. The number of student admissions in vocational-technical educational institutions will increase to 1.7 or 1.8 million, which is 70-80 per cent greater than average admissions per year in the last five years.

We plan to train approximately 7 million specialists with higher and secondary education, or 65 per cent more than in 1961-65. The admission of students in secondary special educational institutions should reach 1.6 million in 1970, and in higher educational institutions 940,000 persons. This means that in 1970 there will be approximately 5.3 million persons in secondary specialized education and 4.6 million in higher educational institutions, 2.5 and 1.9 times more than in 1960.

Such are the prospects for the development of education in the USSR for 1970; they fully correspond to the plan for the development of education in our country for the next twenty years drawn up by the CPSU.

Such educational development in our country also accords with the task of communist construction in the USSR; it is based on calculations of the demand for skilled workers and specialists and on the actual possibilities of expanding the physical plant of educational establishments, and it will ensure in future a steep rise in cultural and technical standards and in the prosperity of the Soviet people.

General conclusion

The publication of this book is linked with an historic date in the life of the peoples of the USSR, for in 1967 the Soviet people commemorated the fiftieth anniversary of the great socialist Revolution of October 1917 and celebrated the achievements of communism, Marxism-Leninism, and the inspiration of V. Lenin, leader of the revolution, founder and chief of the Communist Party and of the Soviet State. This anniversary has enabled the Soviet people to look back upon half a century of struggle and achievement in their progress from a technically and economically backward society to modern industry and mechanization of agriculture, from an illiterate population to an exceptional development of education, science and culture. Fifty years of experience devoted to the building of socialism in the USSR have shown that in a relatively short period of time from an historical point of view, the socialist industrialization of the national economy and the cultural revolution have enabled the agrarian and backward pre-revolutionary Russia to become an industrial and agricultural power.

Tsarist Russia's share of the industrial production of the world amounted in 1913 to slightly over 4 per cent. By 1920, the disorganization caused by the First World War and the civil war had lowered the output of heavy industry almost seven times below what it was in 1913, while agricultural production was only two-thirds of what it had been. Now Soviet industry represents almost one-fifth of the total world industrial production, although the population of the USSR amounts to only one-fifteenth of the world's population.

The success in the industrialization of the country has been obtained without help from foreign sources. The workers of the Soviet Union have accepted sacrifices and limited their material needs in order to solve more quickly the problems involved in the industrialization of the country, and thus ensure the economic independence of the USSR.

During the past fifty years, Soviet knowledge has expanded widely in all fields of science and modern technology. Socialist culture, literature and art, steeped in the greatest accomplishments of the past, have become an integral part of the life of the proletariat and are making an active contribution to the education and full development of man in communist society.

Socialism has brought instruction and culture to the Soviet people; it has elevated and enriched the spiritual life of our society. The Soviet people have obtained great success in the education of youth and the preparation of qualified workers and specialists for all branches of the national economy and culture. The cultural revolution in the USSR, a solid link in Lenin's plan for the building of socialism, has provided the workers with great opportunities for advancement. This country in which the majority of the population was illiterate half a century ago has built up, in the years following the October Revolution, a truly democratic system of education. The peoples of our multinational country each have schools in their native language, and eight years of schooling are compulsory throughout the Soviet land. The number of specialists with higher education or specialized secondary schooling employed in the national economy has increased by more than sixty-three times in comparison with the period before the revolution and totalled, as of 15 November 1965, more than 12 million, of whom 4.9 million had received higher education. If housewives, military personnel and pensioners were included, the total would exceed 17 million.

Higher education alone prepared 2,412,000 specialists during the years 1958-65, thus making it possible to increase greatly the number of qualified technical workers in all branches of the national economy. Major improvements were made during that seven-year period in the distribution of institutions of higher education. In view of the development of the forces of production, twenty-two new such institutions besides dozens of branches were installed in areas of heavy industrial and agricultural concentration.

Particularly rapid development has taken place in specialist training for the branches which ensure technological progress and increase labour productivity. The number of students in the engineering schools increased by more than 1 million in the seven years. Each year of the period surpassed any of our pre-war five-year plans in the number of specialists trained.

Higher education has developed at a rapid rate in all Union republics. The number of specialists who received higher training and are now employed in the national economy doubled during the seven years in the republics of Kazakhstan and Uzbekistan, in the Baltic republics and in other republics of the Union. There are now numerous intellectuals in each republic and the level of higher education there has now surpassed the level of specialist training in many developed capitalist countries. This is a great victory for the Leninist national policy.

At the present time, a period in which our country is undergoing important reforms in the building of communism, a high level of theoretical and practical specialist training takes on increasing importance for the development of productive forces, the increase of productivity, the improvement of social relations, and the development of science and culture.

The twenty-third congress of the CPSU proposed a task of extreme importance: to complete by 1970 the introduction of compulsory secondary-level education for all youth and to continue the development of institutions at the higher and secondary specialized level. The higher educational institutions and technicums now have more than 8 million students - 4.1 million belonging to the ranks of the Soviet intelligentsia. In the first year of the most recent five-year plan, in 1966, our national economy welcomed more than 1.1 million specialists, of whom 400,000 had higher training and nearly 700,000 had secondary-level training. In that same year, the higher and secondary specialized schools enrolled 2.1 million students - 900,000 at the higher level and 1.2 million in the technicums; vocational and technical schools prepared more than one million young skilled workers, and a total of 14 million persons improved their vocational qualifications or learned new occupations.

The work of the Soviet institutions of higher or secondary education is always determined by the problems which the State places upon the agenda at any given stage of the building of communism. The tasks proposed by the twenty-third congress of the CPSU, in March-April 1966 - based on maximum utilization of the progress of science and technology, and on an increased industrial output - consist in an accelerated and constant rhythm of development of agriculture, thereby obtaining an appreciable improvement in the standard of living and satisfying to a better degree the material and cultural needs of all Soviet citizens. This presupposes new and higher requirements in regard to the scientific organization of specialized higher-level and secondary-level education in general.

This is why, following the decisions taken by the twenty-third congress, new measures were adopted at the end of 1966 intended to improve specialist training, the direction of higher and specialized secondary education in the country, and also the work of the general secondary schools. All these measures are expected to upgrade the level of general education and contribute further to the scientific and technical preparation of high-level workers and specialists.

The basic task which these new directives lay down for the teaching staff of Soviet schools, and particularly for those at higher and secondary specialized levels, is to improve the quality of the training and education of specialists, taking fully into account the current requirements of production, of science, technology and culture, as well as the forecast for their development, and also to raise the level of theoretical education in all disciplines. With those targets in view, a whole series of measures are now being set up in order to determine scientifically the scope and content of every branch of education, of each subject, to improve the practical and economic preparation of specialists and to organize and plan study programmes scientifically. This is being done in conjunction with research and development of new and more efficient teaching methods, including increased use of audio-visual media (radio, television, cinema, electronic machines for mathematics, etc.) and programmed instruction methods.

In order to improve the qualifications of the teaching staff in institutions of higher education, the directives authorize the Ministry of Higher and Secondary Specialized Education of the USSR to create institutes and faculties for refresher courses in three-to six-month courses. In this way, all the 220,000 members of the teaching staffs of higher educational establishments will have the opportunity every five years to bring their professional knowledge up to date by a term of advanced work in these institutes. Similarly, with a view to upgrading the training qualifications of teachers in technicums, the number of departments in the higher educational institutions for this purpose has been increased and refresher courses of up to four months have been organized.

In order to create establishments of higher education which will serve as a basis for generalization and the elaboration of subject-matter and teaching methods, the preparation of textbooks and teaching material, and for the training and retraining of the teaching staffs of all VUZy in the country, the Ministry of Higher and Secondary Specialized Education of the USSR has been given direct control over twenty-nine of the largest establishments of higher education in the country.

The new directives also provide for the implementation of another series of measures intended to improve the planning of specialist training (all annual plans and forecasts for specialist training in higher and specialized secondary education will now be prepared directly by the Ministry of Higher and Secondary Specialized Education of the USSR, based upon the proposals of the councils of ministers of the Union republics and of the ministries and services which administer establishments of higher education, and they will be presented to the Gosplan of the USSR for approval); to strengthen the material base of the educational institutions; and to ensure the conditions necessary for wider and more intensive scientific research and the application of its results in practice.

In celebrating the fiftieth anniversary of the great October Socialist Revolution, the Soviet people have been proud of the progress made in all aspects of their lives and especially in everything which concerns their cultural development.

Annexes

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ANNEX I. Model form of summary balance-sheet of labour reserves, for each Union republic

	1962 (base)			1963 (planned)			1964/65 (draft plan for separate years)		
	Total	Of which		Total	Of which		Total	Of which	
ITEM		Town	Village		Town	Village		Town	Village

N.B. In practice, all the items below are placed in the first column

I. Labour supply (allowing for power used)

Total . . . .

Of which:

Population of working age (minus disabled unemployed, groups I and II, and persons receiving pensions on favourable conditions) . . . . . .

Employed adults and adolescents up to 16 years . . . .

New distribution of manpower resources in the republic (+ or -) . .

Re-allocation of able-bodied populations from village to town (+ or -) .

II. Distribution of labour reserves by type of occupation

1. Employed in public economy . .

Of which:

(a) Workers and employees in state, co-operative and public institutions and organizations . . . . .

Total . . . .

Of whom, registered under labour plan:

(b) Collective farmers, employed in the public administration of kolkhozes . . . .

2. Other workers (craftsmen, not members of co-operatives) . . . .

3. Day-release students of 16 years and older . . . .

4. Workers employed in domestic and personal, ancillary work . . .

Of whom:

(a) Members of workers' and employees' families, working in personal, ancillary jobs . . . .

(b) Members of collective farmers' families, working in personal, ancillary jobs . . . .

(c) Persons employed in households of members of workers' and employees' families . . . .

III. Distribution of persons employed in the national economy, classified by branch of industry and the national economy

Number employed in the national economy (including personal, ancillary occupations) . . . .

Of whom:

In industry . . . .

In construction . . . .

In agriculture . . . .

Among whom:

In state enterprises . . . .

In kolkhozes . . . .

In personal, ancillary employment of collective farmers, workers and employees . . . .

In sylviculture . . . .

In transport and communications (servicing a factory or works) . .

In trade, public catering, procurement and in supplying technical materials . . . .

In other branches of material production . . . .

In non-productive occupations, such as:

Education, culture and the arts . .

Science and science research . . .

Public health, physical culture and social security. . . . .

Communal housing . . . .

Transport, communications (serving the community and non-productive branches) . . . .

Staffs of state administrative bodies, boards of co-operative and public organizations, credit and insurance institutions . . . .

For reference purposes

1. Number of disabled unemployed, groups I and II, of employable age .

2. Number of able-bodied unemployed drawing pensions on favourable terms . . . .

3. Number of workers and employees living in villages but working in towns . . . .

4. Number of pupils 16 years old and over, resident in villages but studying in towns . . . .

5. Number of students of higher and secondary specialized educational establishments, employed during practical industrial training in enterprises and organizations in established posts, not shown in this return under II. 3 (average annual evaluation) . . . .

6. Number of students of vocational-technical educational establishments holding jobs while undergoing industrial training, not shown in this return under II, 1 a) (average annual estimate). . . . .

ANNEX II. Estimate form of number of workers and employees additionally required and sources of supply (in Union republic, ministry, USSR department) (in thousands)

N.B. In practice, all the items below are placed in the first column

ITEM	1962 (actual)	1963 (planned)	1964 (draft plan)	1965 (draft plan)
Number of workers and employees per Union republic (ministry, department)				
Additional number of workers and employees required				
Total				
Of which:				
To augment numbers, to replace leavers (leaving for study or military service, completing term of labour contract, retiring on pension, and as result of natural losses)				
Fulfilment of requirements in workers and employees additionally needed				
Total				
Sources of recruitment				
Persons finishing vocational-technical institutes				
Persons finishing secondary general-educational schools				
Persons finishing incomplete secondary general-educational schools				
Graduates of higher and secondary specialized educational institutes				
Students of VUZy and pupils of secondary specialized educational institutes, working in established posts				
Pupils of vocational-technical institutes who reveal productive capacity during their compulsory training period (yearly average)				
Persons working at home or individual farmers				
Collective farmers released from groups of kolkhozes				
Soldiers released from military service, retired persons, etc.				
Shortage				
Proposals for recruitment in other Union republics:				
Recruitment organized by workers and employers				
Dispatching of former students of vocational-technical schools				
Population shifts (thousand families)				

ANNEX III. Form of analytical estimate of young persons completing general educational schools ([a]), per Union republic (in thousands)

N. B. In practice, all the items below are placed in the first column

ITEM	1962 (actual)			1963 (planned)			1964/65 (draft plan by year)		
	Total	Of which		Total	Of which		Total	Of which	
		Town	Village		Town	Village		Town	Village
Finishing grade 8 of secondary school									
Entering grade 9 of secondary school									
Not continuing education in grade 9 of secondary school									
Drop-outs from grades 9 and 10 (11)									
Number of young persons who will not continue education in secondary general educational schools									
Total									
Number of above entering:									
Technicums and other secondary specialized educational institutes (as day-release students)									
Vocational-technical schools									
Kolkhozes									
Work in state institutions, enterprises and organizations									
Number of young persons completing education in secondary general educational schools									
Total									
Number of above entering:									
In VUZy (as day-release students)									
In technicums and other secondary specialized educational institutes (as day-release students) and the Soviet Army									
In kolkhozes									
In state institutions, enterprises and organizations									
Total number of young persons completing general educational schools and liable to be called up to work in state enterprises, institutions and organizations ([b])									

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a. In all enterprises and organizations situated in Union republic territory, however subordinated. Young persons finishing secondary general educational schools and vocational-technical schools are distributed by branch of national economy

b. Young persons and adolescents who did not work or study in the year preceding the planning year are also included in the work-assignment estimate

ANNEX IV. Draft plan form showing development of general educational schools, for Union republic, Ministry of Communications (at beginning of school year)

ITEM	1962 (actual)			1963 (planned)			1963 (expected fulfilment)			1964/65 (draft plan by year)		
	Towns	Rural locality	Total	Towns	Rural locality	Total	Towns	Rural locality	Total	Towns	Rural locality	Total

N.B. In practice, all the items below are placed in the first column

Total number of general educational schools
Of which:
Eight-year schools
Secondary schools
Out of total number of schools:
Boarding-schools
Extended-day schools
Number of pupils, including boarding schools (in thousands)
Of whom:
In grades 1 to 4
In grades 5 to 8
Grade 8 pupils
In grades 9 to 11
Out of total number of pupils (in thousands)
Pupils in boarding-schools
Pupils in extended-day schools and groups
Pupils 16 years old and over
Number of pupils living in hostels attached to schools
Leavers:
From grade 8
From grades 10 and 11

Admissions:
To grade 1
To grade 9

Total number of grades and sets of grades(including grades in boarding-schools)
Of which:
Sets of grades 1 to 4
Sets of grades 5 to 8
Grade 8 pupils
Grades 9 to 11

Average number of pupils in one grade
Of whom:
In 1-4 grade schools
In 5-8 grade schools
In 9-11 grade schools

Number of pupils (in thousands)
In first shift
In second shift

Of total number of pupils in boarding schools:
Grades 1 to 4
Grades 5 to 8
Grades 9 to 11

Total number of grades in boarding-schools
Of which:
Grades 1 to 4
Grades 5 to 8
Grade 8 pupils
Grades 9 to 11

Total number of pupils in schools for young workers and peasants and in correspondence schools
Of whom:
Pupils in young workers' schools (in thousands)
In grades 9 to 11
Grade 8 leavers
Grade 10-11 leavers

Pupils in rural youth schools (in thousands)
Grades 9 to 11
Grade 8 leavers
Grade 10-11 leavers

Pupils in correspondence schools (in thousands)
In grades 9 to 11
Grade 8 leavers
Grade 10-11 leavers

ANNEX V. Form for estimating enrolment of pupils in general educational schools

ITEM	At 1 Sept. 1964	Drop-outs during year		At end of school year allowing for drop-outs during year	Repeaters		At 1 Sept. 1965	For each year of the planning period
		Percentage	Amount		Percentage	Amount		

N.B. In practice, all the items below are placed in the first column

Admitted to grade 1

In grade 1
In grade 2
In grade 3
In grade 4
In grades 1 to 4
In grade 5
In grade 6

In grade 7
In grade 8
In grades 5 to 8

Grade 8 leavers

Admitted to grade 9 after finishing grade 8
Percentage

In grade 9
In grade 10
In grades 9 and 10
In grades 1 to 10

Grade 10 leavers
Total

In grades 1 to 10

ANNEX VI. Form showing calculation of cost of upkeep of schools under heads of expenditure (in roubles)

TYPE OF EXPENDITURE	1962				Planned for 1963			
	1-4	5-7	8-10	Total	1-4	5-7	8-10	Total

N.B. In practice, all the items below are placed in the first column

Average annual number of grades
Average annual number of grades for estimating teachers' salaries
Calculation of costs per grade
Number of positions
Monthly salaries
Annual salaries
Annual budget for wages
Cost of correcting exercise-books
Total cost of teachers' salaries
Other forms of payment for teachers
Amount of salaries paid to administrative-service and educational staff (less savings)
Organizational and travelling costs
Tutorial and other costs (less costs of industrial training)
Cost of industrial training in grades 9 and 10
Cost for all grades (in roubles thousands)
Salaries of teaching staff
Other forms of payment for teachers
Salaries of administrative-service and educational staff (less savings).
Total salaries budget
Supplements to salaries (5-8%)
Organizational and travelling costs
Educational and other costs
Costs of industrial training
General total

ANNEX VII. Form for an analytical estimate showing additional requirements in skilled workers and sources of their recruitment (for Union republics, ministries and USSR departments) ([a])

ITEM	Number of specialized workers	Additional requirements			Source of additional requirements					
		Total	To augment numbers	To replace leavers ([b])	Graduates of vocational-technical institutes		Graduates of secondary general education schools	Persons trained directly in industry	Other sources	
					Total	Institutes in other Union republics			Total	Specialists from other Union republics

N.B. In practice, all the items below are placed in the first column

Total
I. Industry
Chemical industry (not including enterprises in the chemical-pharmaceutical industry)
Petrochemical industry (including rubber technology industry)
Oil extraction industry
Coal-mining industry
Machine building and metal processing ([c])
  Of which:
Chemical and oil machinery construction ([c])
Timber, paper and wood-working industries
Building-materials industry
Other branches of industry
II. Construction
III. Agriculture
  Of which:
Sovkhozes and other agricultural enterprises and organizations (total)
  Of which:
Tractor- and combine-operators
Motor-vehicle drivers
Other specialized workers
Kolkhozes (total)
  Of which:
Tractor- and combine-operators
Motor-vehicle drivers
Other specialized workers
IV. Transport
  Of which:
Rail transport
V. Communications
VI. Food and commerce
VII. Other branches of national economy

For reference purposes

Total number of tractors per year
  Of which:
In sovkhozes and other state agricultural enterprises and organizations
In kolkhozes

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[a] Separate forms to be completed for the different years: report (preceding) year, current year (expected fulfilment of scheduled plan) and for each year of the planning period (draft plan). Figures showing additional requirements taken from graduates of vocational-technical institutes must tally with numbers shown as graduating from the rail institutes

[b] Show additional numbers required to replace workers leaving to obtain education, to join Soviet Army, on completion of term of labour contract, on pension, consequent on natural losses, and also on transfer to specialist posts

[c] Show source of supply of additional requirements in the form of persons taken into employment under an organized draft, a public call-up or jobs assigned to men demobilized from the Soviet Army

ANNEX VIII. Form for recording changes in the vocational composition of workers as a result of mechanization and automation of production (by enterprises, construction sites and organizations)

Appellation of new equipment and other technical mechanization and automation appliances introduced in the planning period	New vocations and specialized trades of workers connected with servicing the said equipment		Appellation of equipment replaced	Vocations and special trades left free	
	Appellation	Number		Appellation	Reduction in numbers
1.					
2.					
3.					
Total					

ANNEX IX. Form for draft plan for skilled worker training in vocational-technical schools in a Union republic (in thousands)

ITEM	1962 (actual)	1963 (planned)	1964/65 (draft plan by year)

N.B. In practice, all the items below are placed in the first column

I. Day vocational-technical institutes

1. Network of day vocational-technical institutes at end of year
Of which:
Urban schools
Rural schools

2. Number of pupil places at end of year (in thousands)
Of which:
Urban schools
Rural schools

3. Construction and expansion of vocational-technical institutes (inauguration), number of pupil places (in thousands)
Of which:
Urban schools
Rural schools

4. Pupil enrolment carried over at start of planning year
Of whom:
Urban schools
Rural schools

5. Admissions to vocational-technical schools of the republic
Of whom:
Urban schools (total)
For training periods:
One year
Two years
Three years
Three years and upwards
Rural schools (total)
For training periods:
One year
Two years
Three years

6. Total admissions of pupils to vocational-technical schools to be trained as skilled workers for enterprises and organizations of other Union republics (show separately for which republics skilled workers are being trained)

7. Number of pupils graduating from vocational-technical schools in a republic [a]
Of whom:
Urban schools
Rural schools

8. Number of skilled workers finishing training in vocational-technical schools who are drafted into enterprises and organizations of other Union republics (show separately republics into whose enterprises the skilled workers are drafted).

9. Average annual number of pupils
Of whom:
Urban schools
Rural schools

II. Evening (shift) vocational-technical institutes and evening (shift) departments of day vocational-technical institutes

1. Network of evening (shift) vocational-technical schools at end of year (units)
Of which:
Urban schools
Rural schools

2. Pupil enrolment carried over at start of planning year
Of whom:
Urban schools and departments
Rural schools and departments

3. Admissions of pupils
Of whom:
Urban schools and departments
Rural schools and departments

4. Number of pupils graduating
Of whom:
Urban schools and departments
Rural schools and departments

5. Average annual number of pupils
Of whom:
Urban schools and departments
Rural schools and departments

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[a] To be shown for same branches of industry and national economy as those used for the analytical estimate of additional requirements in skilled workers and sources of their recruitment

ANNEX X. List of specializations taught in higher educational establishments of the USSR

Index No.	
	1. Geology and exploration of mineral deposits
0101	Geology and prospecting of mineral deposits
0102	Geological surveying and searching for mineral deposits
0103	Geology and prospecting of oil and gas deposits
0105	Geophysical methods of searching and prospecting for mineral deposits
0106	Geo-chemistry (universities)
0107	Hydrogeology and engineering geology
0108	Technology and techniques of prospecting for mineral deposits
	2. Exploitation of mineral deposits
0201	Mine surveying
0202	Technology and comprehensive mechanization of the underground exploitation of mineral deposits
0203	Technology and comprehensive mechanization of the exploitation of peat deposits
0204	Beneficiation of mineral deposits
0205	Technology and comprehensive mechanization of the exploitation of oil and gas deposits
0206	Construction of underground structures and pits
0207	Design and operation of gas and oil pipe-lines, gas-holders and oil reservoirs
0208	Construction of gas and oil pipe-lines, gas-holders and oil reservoirs
0209	Technology and comprehensive mechanization of open-cast working of mineral deposits
	3. Power engineering
0301	Electric power stations
0302	Electricity grids and networks
0303	Electricity supplies for industrial enterprises and cities
0304	Cybernetics of electricity grids
0305	Thermal electricity power stations
0306	Water processing and water-supply system of thermal and atomic power stations
0307	Hydro-power installations
0308	Industrial thermal power engineering
0309	Physics of thermal processes
0310	Atomic power stations and installations
0312	Engineering electro-physics
	4. Metallurgy
0401	Metallurgy of ferrous metals
0402	Metallurgy of non-ferrous metals
0403	Thermal technology and automation of metallurgical furnaces
0404	Casting of ferrous and non-ferrous metals
0405	Physical-chemical research techniques in metallurgical processes
0406	Physics of metals
0407	Metallography, equipment and technology of thermal processing of metals
0408	Pressure-processing of metals
0411	Metallurgy and technology of welding
	5. Mechanical engineering and instrument construction
0501	Technology of mechanical engineering, metal-cutting lathes and tools
0502	Machinery and technology of casting processes
0503	Machinery and technology of pressure-processing of metals
0504	Equipment and technology of welding processes
0505	Mechanical equipment of ferrous and non-ferrous metallurgical works
0506	Mining machinery and outfits
0507	Peat-mining machinery and outfits
0508	Machinery and equipment for oil and gas fields
0509	Agricultural machinery
0510	Lifting, hoisting and transportation machinery and equipment
0511	Construction and road-making machinery and equipment
0512	Wagon-building and wagon works
0513	Motor cars and tractors
0514	Shipbuilding and ship repairing
0515	Printing machinery
0516	Machinery and installations for chemical works
0517	Machinery and installations for food manufacture
0518	Machinery and installations for light and textile industries
0519	Machinery and mechanisms for forestry and woodworking industries
0520	Boiler construction
0521	Turbine construction
0522	Machinery and equipment for communication enterprises
0523	Internal combustion engines
0524	Ship engines and mechanisms
0525	Ship power installations
0526	Locomotive building
0527	Dynamics and durability of machinery
0528	Hydraulic machinery and automatic devises
0529	Refrigeration machinery, compressors and installations
0530	Optical instruments and spectroscopy
0531	Precision instruments
0532	Semi-conductor and electro-vacuum engineering
0533	Cinematograph apparatus
0535	Aircraft construction
0537	Aircraft engines
0541	Hydro-pneumatic automation and hydraulic drive
0553	Hydro-aerodynamics
0558	Machinery and installations for cellulose pulp and paper production
0561	Chemical machinery apparatus building
0562	Mechanical equipment for firms producing building materials, products and constructions
0563	Machinery and technology of the processing of products and parts from polymer materials
	6. Electronics, electrical instrument construction and automation
0601	Electrical machinery and apparatus
0602	Electric traction and automation of traction-units
0603	Electric insulation and cable technology
0604	Semi-conductors and dielectrics
0606	Automation and telemechanics
0607	Electronic physics

0608	Mathematical and computing devices and appliances
0609	Gyroscopic instruments and appliances
0610	Electro-acoustics and ultra-sonic equipment
0611	Electronic instruments
0612	Industrial electronics
0613	Electro-thermal installations
0614	Lighting engineering and light sources
0615	Sound engineering
0617	Manufacture of aircraft instrumentation
0618	Electrical equipment for aircraft and motor tractors
0619	Electrical equipment of ships
0621	Technical operation of aircraft instruments and electrical equipment of aircraft
0623	Electro-mechanical equipment for communications
0626	Information-measuring engineering
0627	Electronic medical instruments
0628	Electrical gearing and automation of industrial installations
0629	Semi-conductor instruments
0630	Technology of special materials used in electronics
0634	Electrification and automation of mining operations
0635	Automation and comprehensive mechanization of metallurgy
0636	Automation and comprehensive mechanization of machinery building
0637	Automation of thermal and electric power processes
0638	Automation and comprehensive mechanization of building construction
0639	Automation and comprehensive mechanization of chemical technological processes
0640	Automation and mechanization of information-processing and publishing processes

7. Radio engineering and communications

0701	Radio engineering
0702	Automatic electrical communications
0703	Radio communications and broadcasting
0704	Radio-physics and electronics
0705	Construction and production of radio apparatus
0706	Technical operation of aircraft radio equipment
0708	Multi-channel electrical communications

8. Chemical technology

0801	Chemical technology of gas and oil processing
0802	Chemical technology of solid fuel
0803	Technology of inorganic substances and chemical fertilizers
0804	Chemical technology of rare and diffused elements
0805	Technology of electro-chemical processes
0806	Chemical technology of viscous materials
0807	Technology of basic organic and petrochemical synthesis
0808	Chemical technology of organic dyestuffs and intermediate products
0809	Chemical technology of biologically active compounds
0810	Chemical technology of plastics and synthetic rubber
0811	Chemical technology of varnishes, paints, and non-metallic coatings
0812	Technology of rubber
0813	Chemical technology of cinematographic-photographic materials
0819	Chemical technology of electronic and vacuum materials
0822	Chemical kinetics and combustion
0823	Technology of the separation and utilization of isotopes
0824	Basic processes in chemical manufacture and the cybernetics of chemistry
0825	Radiation chemistry
0828	Technology of the processing of plastics
0829	Technology of chemicals used for plant protection
0830	Chemical technology of ceramics and refractory materials
0831	Chemical technology of glass and glass-works products
0832	Technology of electro-thermal products
0833	Technology of artificial fibres

9. Timber engineering and the technology of woodpulp, cellulose and paper

0901	Timber engineering
0902	Technology of wood-processing
0903	Chemical technology of woodpulp
0904	Chemical technology of cellulose and paper manufacture

10. Technology of food products

1001	Storage and technology of grain-processing
1002	Technology of bread-baking, macaroni and confectionery production
1003	Technology of saccharines
1004	Technology of fermentation processes
1005	Technology of wine-making
1006	Technology of fats
1007	Technology of canning and preserving
1008	Technology of sub-tropical cultures
1009	Technology of meat and meat products
1010	Technology of fish products
1011	Technology and organization of food services
1012	Fishing industry
1013	Ichthyology and fish-breeding
1014	Technology of milk and dairy produce
1015	Chemical technology of vitamins and albuminoid fermenting preparations
1016	Veterinary hygiene

11. Technology of consumer goods industry

1101	Primary processing of fibrous materials
1102	Spinning of natural and artificial fibres
1103	Chemical technology and equipment of textile finishing mills
1104	Production of knitted goods
1105	Design and technology of ready-made garments
1106	Technology of leather and fur industry
1107	Technology of polymer film materials and synthetic leather
1108	Design and technology of leather products
1109	Technology of printing industry
1110	Manufacture of non-woven textile materials
1111	Weaving

12. Building construction

1201	Architecture
1202	Industrial and civil construction

[continued overleaf]

ANNEX X (continued)

1203 Hydro-technical construction of river works and hydro-electric power stations
1204 Hydro-technical construction of waterways and harbours
1206 Urban construction
1207 Manufacture of building components and structures
1208 Gas and heat supply and ventilation
1209 Water supply and sewerage systems
1210 Construction of railways and roads, traffic engineering
1211 Motorways
1212 Bridges and tunnels
1213 Construction of airports
1214 Purification of natural water supplies and sewage disposal

13. Geodesy and cartography

1301 Engineering geodesy
1302 Astro-geodesy
1303 Aerophotogeodesy (aerial photographic surveys)
1304 Cartography

14. Hydrology and meteorology

1401 Land hydrology
1402 Oceanography
1403 Hydrography
1404 Meteorology
1405 Agricultural meteorology

15. Agriculture and forestry

1501 Agricultural chemistry and soil science
1502 Agronomy
1503 Horticulture, market-gardening and viticulture
1504 Plant protection
1505 Sericulture
1506 Animal husbandry (zootechnics)
1507 Veterinary medicine
1508 Land utilization
1509 Mechanization of agriculture
1510 Electrification of agriculture
1511 Hydromelioration
1512 Forestry
1513 Mechanization of hydromelioration operations

16. Transportation

1601 Locomotives and their maintenance
1602 Electrification of railway transport
1603 Automatics, telemechanics and signalling in railway transport
1604 Operation and maintenance of railways
1605 Municipal electric transportation
1606 Maritime navigation
1607 Inland waterway navigation
1608 Operation and maintenance of water transport
1609 Motor vehicle transport
1610 Operation and maintenance of aircraft and engines
1611 Operation and maintenance of air transport
1612 Operation and maintenance of ships' power installations
1613 Operation and maintenance of ships' electrical installations
1614 Mechanization of harbour-loading/unloading operations

17. Economics

1701 Planning of the national economy
1702 Planning of industry
1703 Economics and planning of supplies of technical materials
1704 Economics of labour
1705 Economics and organization of the mining industry
1706 Economics and organization of the oil and gas industries
1707 Economics and organization of the electric power industry
1708 Economics and organization of metallurgical industry
1709 Economics and organization of the engineering industry
1711 Economics and organization of the chemical industry
1712 Economics and organization of the printing and publishing industry
1713 Economics of the cinematograph industry
1714 Economics and organization of the consumer goods industry
1715 Economics and organization of agriculture
1716 Planning in agriculture
1717 Economics and organization of procurement of agricultural produce
1718 Economics and organization of the foodstuffs industry
1719 Economics and organization of the timber industry and forestry
1720 Economics and organization of the woodworking and pulp and paper industry
1721 Economics and organization of building construction
1722 Economics and organization of municipal services
1723 Economics and organization of railway transport
1724 Economics and organization of water transport
1725 Economics and organization of motor vehicle transport
1726 Economics and organization of air transport
1728 Economics and organization of communications
1729 Economics of trade
1731 International economic relations
1732 Merchandizing of industrial goods
1733 Merchandizing of food products
1734 Finance and banking
1736 Statistics
1737 Accountancy
1738 Organization of the mechanized programming of economic information

18. Law

1801 Jurisprudence
1802 International relations

19. Public health and physical culture

1901 Medical services

1902	Pediatrics
1903	Public health
1904	Stomatology
1905	Pharmacy
1906	Physical culture and athletics

20. Specializations in universities

2001	Russian language and literature
2002	Native language and literature
2003	Slavonic languages and literature
2004	Romance and Germanic languages and literature
2005	Oriental languages and literature
2006	Classical philology
2007	Area studies of Eastern frontier countries
2008	History
2009	Historical and archive studies
2010	Political economy
2012	Psychology
2013	Mathematics
2014	Mechanics
2015	Astronomy
2016	Physics
2017	Geophysics
2018	Chemistry
2019	Biology
2021	Zoology and botany
2022	Physiology
2024	Anthropology
2027	Journalism
2028	Literary composition
2029	History of the arts
2030	Geography
2033	Biophysics
2034	Biochemistry
2035	Economic cybernetics

21. Specializations in pedagogical and cultural VUZy

2101	Russian language and literature
2102	Native language and literature of peoples of the USSR
2103	Foreign languages
2104	Mathematics
2105	Physics
2106	Biology
2107	Geography
2108	History
2109	Draughtsmanship and drawing
2110	Pedagogy and psychology (pre-school)
2111	Defectology
2112	Cultural-education work
2113	Librarianship and bibliography
2114	Physical education
2119	Music and singing
2120	General technical subjects and manual labour
2121	Pedagogy and teaching methods at primary level

22. Arts

2201	Piano (organ)
2202	Orchestral instruments
2203	Folk instruments
2204	Singing
2205	Operatic and symphonic conducting
2206	Choral direction
2207	Composition
2208	Musical theory
2209	Dramatic theatre and cinema acting
2210	Musical comedy acting
2211	Drama production, staging and directing
2212	Musical theatre production, staging and directing
2213	Ballet production, staging and directing
2214	Cinema production, staging and directing
2215	Cinema operation techniques
2216	Theatrical techniques (staging effects) and staging of plays
2217	History and development of theatre arts
2218	History and development of cinema arts
2219	Painting
2220	Drawing
2221	Sculpture
2222	Decorative and applied arts
2227	Art design and fashioning of products of the textile and light industries
2228	History and theory of figurative art
2229	Interior decoration and furnishing
2230	Industrial art
2231	Monumental and decorative art

ANNEX XI. List of specializations taught in secondary specialized educational establishments in the USSR

1. Geology and exploration of mineral deposits

Index No.	
0101	Geology and prospecting of mineral deposits
0102	Geology and prospecting of oil and gas deposits
0103	Geophysical methods of surveying and exploration of mineral deposits
0104	Geophysical methods of oil-fields research
0105	Hydrogeology and engineering geology
0106	Techniques of prospecting for mineral deposits

2. Exploitation of mineral deposits

0201	Mine surveying
0202	Underground mining of ore and non-metallic deposits
0203	Underground mining of coal deposits
0204	Open-cast mining of mineral deposits
0205	Exploitation of peat deposits
0206	Minerals concentration
0207	Exploitation of field deposits

[continued overleaf]

ANNEX XI (continued)

0208 Coal beneficiation and briquetting
0209 Drilling of oil and natural-gas wells
0210 Exploitation of oil and natural-gas wells
0211 Construction of mining enterprises

3. Power engineering

0301 Electric power stations, networks and grids
0302 Relay protective and automatic devices of electric power grids
0303 Electrical equipment of industrial enterprises and installations
0304 Electrical equipment of lumber camps
0305 Electrical equipment of ships
0306 Assembly of thermal power equipment of electric power stations
0307 Electrical engineering equipment of civilian buildings and communal enterprises
0308 Mining electromechanics
0309 Boiler house and steam-turbine installations
0310 Electric thermotechnical measuring
0311 Technology of water, fuel and lubricating materials
0312 Assembly and exploitation of hydraulic power installations
0313 Thermotechnics of gas-fired furnaces
0314 Thermotechnical equipment of industrial enterprises
0315 Construction and assembly of electric transmission lines and sub-stations
0316 Assembly of electrical equipment of stations and sub-stations
0317 Assembly of electrical equipment of industrial enterprises
0318 Electrical equipment of elevators, warehouses, and grain-processing enterprises
0319 Maintenance and operation of electrical equipment of ships
0320 Maintenance and operation of electrical equipment of inland waterway vessels

4. Metallurgy

0401 Blast furnace production
0402 Productions of steel
0403 Electrometallurgy of steel and iron alloys
0404 Metallurgy of rare and heavy non-ferrous metals
0405 Metallurgy of light metals and titanium
0406 Metallurgy of semi-conductor materials
0407 Dust-collecting and purification of technological and ventilation gases
0408 Casting of ferrous metals
0409 Casting of non-ferrous metals and production of alloys
0410 Technology of secondary metals
0411 Metallography and thermal processing of metals
0412 Metal-rolling production
0413 Powder metallurgy and production of hard alloys
0414 Wire, calibrating and cable production
0415 Forging and stamping
0416 Extrusion of non-ferrous metals and alloys
0417 Agglomeration of ores

5. Mechanical engineering and instrument construction

0501 Processing of metals by cutting
0502 Assembly operation and maintenance of metal-working lathes and automatic production-lines
0503 Metal-working lathes and automatic production-lines
0504 Tool production
0505 Production of abrasive and diamond-cutting tools
0506 Forgin and pressing machinery
0507 Technology of welding production
0508 Rolling and wire-drawing mills and equipment
0509 Equipment of metallurgical factories
0510 Assembly and repair of industrial equipment
0511 Mining engineering
0512 Geological prospecting equipment
0513 Petroleum and natural-gas fields equipment
0514 Transport and storage of petroleum and natural gas
0515 Agricultural machinery
0516 Lifting, hoisting and transportation machinery
0517 Production of stamps and presses
0518 Road machinery and equipment
0519 Railway track and railway construction machinery
0520 Railway-wagon building
0521 Motor-vehicle construction
0522 Construction of oil and gas pipe-lines, gas-holders and oil-tanks
0523 Casting machinery
0524 Ship hull construction
0525 Ship repair
0526 Machinery and mechanisms for specialized ships
0527 Assembly of lifting, hoisting and transportation machinery and equipment
0528 Printing industry equipment
0529 Chemical engineering
0530 Oxygen equipment and apparatus
0531 Equipment for chemical plants and oil and gas refineries
0532 Equipment of coke-chemical plans
0533 Machinery and mechanisms for transport construction
0534 Tractor building
0535 Machinery and equipment for the building materials industry
0536 Glassworks machinery and equipment
0537 Motor cycle construction
0538 Equipment for wood and pulp works and forest chemistry industry
0539 Machinery and equipment for sugar factories and starch and molasses industries
0540 Machinery and equipment for the bread-baking, macaroni and confectionery industries
0541 Equipment for elevators, mills and warehouses
0542 Machinery and equipment for meat industry enterprises
0543 Equipment for the fishing industry and fishing vessels
0544 Machinery and equipment for food and commerce enterprises
0545 Machinery and equipment for textile enterprises

0546	Equipment for artificial fibre plants
0547	Machinery and equipment for fermentation and wine-making plants
0548	Machinery and equipment for sewing factories
0549	Machinery and equipment for the leather and fur industry
0550	Machinery and equipment for polymer and film materials and synthetic leather plants
0551	Machinery and equipment for footwear factories
0552	Machinery and equipment for wood-processing enterprises
0553	Equipment for timber procurement and forestry enterprises
0554	Equipment for timber rafting
0555	Boiler construction
0556	Turbine construction
0557	Internal combustion engines
0558	Ship engines and mechanisms
0559	Equipment for chemical cleaning and garment-dyeing works
0560	Locomotive engineering
0561	Building machinery and equipment
0562	Machinery and equipment for fat-processing enterprises
0563	Hydraulic engineering
0564	Machinery and equipment for canning and preserving factories
0565	Refrigeration and compressor machinery and installation
0566	Refrigeration industry
0567	Production of control and measuring devices and instruments
0568	Production of timing devices
0569	Mechanical measurement
0570	Production of medical apparatus and instruments
0571	Machinery and equipment of tobacco factories
0572	Operation and maintenance of foodstuff and industrial raw material depots, and mechanization of loading and unloading operations
0573	Machinery and equipment for dairy industry enterprises
0574	Mechanization of communication enterprises
0575	Equipment of cinematographic installations
0577	Aircraft construction
0578	Aircraft testing
0579	Operation and maintenance of aircraft and aircraft propulsion devices
0582	Aircraft engines
0597	Optical-mechanical instruments
05102	Equipment and technology for the preliminary processing of cotton
05103	Machinery and equipment for textile finishing mills
05104	Stage equipment
05105	Geophysical apparatus and equipment
05106	Equipment of non-ferrous metal works
05107	Machinery and equipment for knitted goods enterprises
05108	Equipment of plant for processing plastics and rubber

6. Electrical engineering and electric instrument production

0601	Electrical engineering
0602	Electrical equipment engineering
0603	Equipment manufacture for wire communications systems
0604	Electric instrument production
0605	Electric equipment for motor vehicles and tractors
0606	Production of cables and wires
0607	Electric insulation materials and products
0608	Production of electro-vacuum instruments
0609	Equipment for production of electro-vacuum instruments
0610	Production of automation and telemechanic instruments
0611	Production of electronic and electrical automation appliances
0612	Electronic computers, instruments and appliances
0613	Production of tabulating and tabular-analysis machines
0614	Assembly and repair of X-ray and electric medical equipment
0615	Aircraft instruments and automats
0616	Exploitation of aircraft instruments and electrical equipment
0617	Production of aircraft electrical equipment
0618	Technical exploitation of ground radio equipment for aircraft navigation and landing
0619	Technical exploitation of aircraft radio equipment
0621	Gyroscopic instruments
0622	Production of semi-conductor instruments
0623	Production of electro-thermal installations
0624	Assembly and adjustment of control and automatic systems
0625	Exploitation of automatic appliances in the building materials industry
0626	Exploitation of automatic appliances in chemical factories
0627	Exploitation of automatic appliances in the food industry
0628	Exploitation of automatic appliances in the textile and light industries
0629	Exploitation of automatic and telemechanical appliances in oil and gas mains
0630	Exploitation of automatic appliances in the mining industry
0631	Exploitation of automatic appliances in metallurgy
0632	Electric lighting instruments and appliances
0634	Automation in shipping
0635	Automation of thermal processes in electric power stations
0636	Exploitation of technical cinematographic equipment
0638	Manufacture and exploitation of radio-electronic medical apparatus
0639	Electrical apparatus for everyday purposes
0640	Equipment of semi-conductor instrument factories
0641	Equipment of factories producing radio parts and components
0642	Production of hydraulic and pneumatic automation devices
0643	Exploitation and repair of tabulating and tabular analysis machines
0644	Electronic-optical instruments
0645	Exploitation of automatic appliances in the cellulose-, paper- and pulp-industry
0646	Electric welding equipment

[continued overleaf]

ANNEX XI (continued)

0653 Exploitation of automatic appliances in the woodworking industry
0654 Fire-fighting engineering and fire protection

7. Radio engineering and communications

0701 Radio communications and broadcasting
0702 Merchant and fishing fleet radio communications and radar navigation
0704 Radio equipment construction
0705 Production of radio insulators and components
0706 Television equipment and radio communication networks
0707 Wire communication
0708 Regional electrical communications and radio broadcasting
0709 Line and cable equipment for communications system
0710 Postal communications
0711 Radar and radio-location devices
0712 Radio technical measurements
0713 Assembly of radio electric equipment in aircraft
0714 Radio communications and radar navigation of inland waterways vessels
0715 Technology of electro-vacuum and radio-insulation materials
0716 Hydrometeorological radar detection devices
0717 High-frequency communications and telemechanics of electrical transmission lines

8. Chemical technology

0801 Chemical technology of oil and gas
0802 Technology of coke-chemical production
0803 Technology of mineral fertilizers and acids
0804 Technology of glass and glass products
0805 Technology of electro-chemical products
0806 Technology of electrodes and electric coal products
0807 Electro-chemical coatings
0808 Technology of viscous materials
0809 Technology of refractory materials
0810 Technology of organic synthesis
0811 Technology of organic dyes and intermediate products
0812 Synthetic aromatic products
0813 Chemical technology of synthetic tars and plastics
0814 Technology of varnishes and paints
0815 Non-metallic protective coatings
0816 Technology of rubber
0817 Technology of cinematographic photographic materials
0818 Analytical chemistry
0826 Technology of ceramics
0827 Technology of soda products and mineral salts
0828 Technology of nitrogen compounds
0829 Technology of electro-thermal products
0830 Technology of synthetic rubber
0831 Technology of plastic products
0832 Technology of chemical reagents and specially pure substances
0833 Technology of artificial fibres

9. Timber engineering and technology of woodpulp, cellulose and paper

0901 Technology of timber procurement
0902 Floating of timber
0903 Furniture production
0904 Sawmill- and wood-processing industry
0905 Production of pulp-fibre sheets and pulp-plastics
0906 Production of veneers and plastics
0907 Production of chemical synthetics from wood
0908 Hydrolysis and sulphide-alcohol production
0909 Pulp and paper production
0910 Processing of paper and cardboard

10. Technology of food products

1001 Flour and grain milling
1002 Storage of grain and grain-processing products
1003 Bread-baking production
1004 Technology and biochemistry of fermenting agents
1005 Technology of saccharines
1006 Brewing industry
1007 Technology of wine-making
1008 Technology of vegetable fats
1009 Technology of preserving and canning
1010 Technology of tobacco
1011 Technology of tea
1012 Technology of meat and poultry products
1013 Technology of dairy products
1014 Synthetic fat substitutes and processing of fats
1015 Technology of fish products
1016 Technology of catering
1017 Fishing industry
1018 Ichthyology and fishing
1019 Catching fish and sea animals
1020 Confectionery industry

11. Technology of consumer goods production

1101 Primary processing of flax and other bast plants
1103 Primary processing and sorting of wool
1104 Cocoon-winding and silk-twisting
1105 Cotton-spinning industry
1106 Weaving industry
1108 Compressed fibre and felt products manufacture
1109 Finishing of fabrics
1110 Finishing of knitwear
1112 Garment industry
1113 Production of fur and sheepskin articles
1114 Primary processing of leather raw materials
1115 Technology of leather
1116 Technology of furs
1117 Technology of polymer film material and artificial leather
1118 Technology of leather products
1119 Knitwear production
1120 Dry-cleaning and dyeing of garments
1121 Production of toys
1122 Production of musical instruments
1123 Technology of raised printing
1124 Technology of non-woven textile materials
1125 Technology of flat printing
1126 Technology of brochure- and book-binding

1127	Technology of photo-mechanical processes
1128	Proof-reading of books and newspapers
1129	Technical editing of books and magazines
1130	Technology of photography
1132	Wool-spinning
1133	Linen-spinning
1134	Spinning of artificial fibres

12. Construction

1201	Architecture
1202	Industrial and civil engineering
1203	Hydrotechnical construction
1204	Assembly of industrial furnaces
1205	Building maintenance
1206	Green belt planting in cities and built-up areas
1207	Production of building units (prefabricated) and ferro-concrete structures
1208	Manufacture of metal (steel) constructions
1209	Assembly of metal (steel) and ferro-concrete structures
1210	Gas production and facilities
1211	Water supply, sewerage systems and purification of industrial water and sewage
1212	Sanitary technical installations in buildings
1213	Construction of water supply and drainage systems and installations
1214	Construction and exploitation of railway permanent ways
1215	Construction and exploitation of urban highways and intrafactory roads
1216	Construction and exploitation of motor-roads
1217	Construction and exploitation of timber transport roads
1218	Construction of tunnels and underground railways
1219	Bridges and other engineering works
1220	Surveying and construction of railways
1221	Construction and exploitation of airports

13. Geodesy and cartography

1301	Goedesy
1303	Cartography
1304	Aerophotogrammetry
1305	Aerial photography
1306	Topography

14. Hydrology and meteorology

1401	Hydrology of land
1402	Oceanology
1403	Meteorology
1404	Agrometeorology
1405	Aerology

15. Agriculture

1501	Agronomy
1502	Horticulture and market gardening
1503	Sericulture
1504	Zootechnics
1505	Hunting and game preservation
1506	Veterinary medicine
1507	Land utilization
1508	Mechanization of agriculture
1509	Electrification of agriculture
1510	Forestry
1512	Irrigation and drainage (hydromelioration)
1513	Mechanization of hydromelioration operations
1514	Agricultural chemistry
1515	Protection of plants
1519	Poultry-breeding

16. Transportation

1601	Operation and maintenance of motor transport
1602	Motor locomotives and their maintenance
1603	Railway truck maintenance
1604	Rolling stock of industrial railway transport
1605	Electromotive railway operations
1606	Railway power supply and exploitation
1607	Automation and telemechanics in railway transport
1608	Operation and maintenance of railways
1609	Operation and maintenance of industrial railway transport
1610	Mechanization of loading operations in transport
1611	Maintenance, repair and power supply in urban electric transportation
1612	Maritime navigation
1613	Inland waterways navigation
1614	Waterway communications
1615	Operation and maintenance of waterway transportation
1616	Dredging operations and navigation of engineering vessels
1617	Maintenance and repair of motor vehicles
1618	Flight maintenance of aircraft
1619	Air navigation
1620	Operation and maintenance of ships' power installations

17. Economics

1701	Planning in mining enterprises
1702	Planning in oil and gas industry enterprises
1703	Planning in metallurgical industry enterprises
1704	Planning in engineering industry enterprises
1705	Planning in light industry enterprises
1706	Planning in food industry enterprises
1707	Planning in lumber procurement enterprises
1708	Planning in pulp and paper and wood-working industry enterprises
1709	Planning in building material enterprises
1710	Planning in building construction
1711	Planning in community servicing enterprises
1712	Planning in railway transport
1713	Planning in water transport
1714	Planning in communication enterprises
1715	Planning in enterprises servicing everyday needs of the population
1716	Planning and statistics of food and material reserves
1717	Planning in Soviet trade
1718	Merchandising of industrial goods
1719	Merchandising of food products
1720	Merchandising of industrial goods and food products (for Centrosoyuz)
1721	Merchandising of books
1722	Merchandising of animal and fur products
1723	Merchandising, supply of technical materials, and distribution
1724	State budget
1725	Finance and credit for capital construction
1726	Currency circulation and credit
1727	Statistics

[continued overleaf]

ANNEX XI (concluded)

1728	Accountancy
1729	Accountancy in trade
1730	Accountancy and operative techniques in the State bank
1731	Merchandising of linen and other bast plants
1732	Planning of agricultural production
1733	Merchandising of agricultural produce
1734	Mechanization of accounting and calculation operations
1735	Programming of computers
1736	Planning in chemical industry enterprises
1737	State insurance
1738	Budget accounting
1739	Planning in electric power stations
1741	Finance and credit for agriculture
1742	Merchandising of cotton
1743	Planning in textile industry enterprises
1744	Accounting in agricultural production

18. Law

1801	Law specialization
1802	Jurisprudence and social security system accounting

19. Public health and physical culture

1901	Medical aid
1902	Midwifery
1903	Medical and laboratory assistants
1904	Public health-medical-assistant
1905	Dental technician
1906	Pharmacy assistant
1907	Technology of chemical- pharmaceutical products and antibiotics
1908	Production of prosthetic appliances
1909	Dental mechanics
1910	Physical culture
1911	Medical nurse

20. Education

2001	Teaching in primary grades of general educational schools
2002	Pre-school education
2003	Teaching of drawing and art
2004	Cultural-educational work
2005	Librarianship
2006	Vocational (labour) teaching in grades 5-8 of general educational schools
2007	Children's nursery training

21. Arts

2101	Piano
2102	Stringed instruments
2103	Wind and percussion instruments
2104	Folklore instruments
2105	Singing
2106	Choir conducting
2107	Musical theory
2108	Ballet dancing
2109	Circus performing
2110	Artistic make-up
2111	Artistic-theatrical props
2112	Artistic-theatrical costumes
2113	Theatre lighting techniques
2114	Theatre stage décor
2115	Sculpture
2116	Artistic painting
2117	Artistic metalwork
2118	Decorative woodwork ivory and stone modelling
2119	Artistic glasswork
2120	Artistic ceramics
2121	Fashioning of shoes and artistic fashioning of leather
2122	Artistic weaving
2123	Artistic modelling and colouring of tissues and knitwear
2124	Artistic embroidery and lace-making
2125	Modelling and designing of clothes
2126	Dramatic acting
2127	Artistic fashioning
2128	Folk dancing
2129	Puppet theatre
2130	Musical comedy
2131	Modelling and designing of fur articles

ANNEX XII. Form for estimating additional requirements in specialists with higher and secondary specialized education (per Union republic, state committee, ministry, department of USSR) for 19... - 19... (in units)

					Additional demand for specialists (19.., base year)							
Numbers of specializations	Groups of specializations and individual specializations	Number of posts to be replaced by specialists	Specialists available		19.. (first year of the planning period)				19.. (last year of plan)			
			Total	Including those employed in work jobs not included in list	Total	To increase number of posts	To replace specialists lost, graduated and praktiki	In partial replacement of praktiki	Total	To increase number of posts	To replace specialists lost, graduated and praktiki	In partial replacement of praktiki
N.B. In practice, all the items herein are placed in the column headed 'Groups of specializations and individual specializations'				With higher education ...... Of which: By groups of specializations and individual specializations, for which there is an additional demand . . .					With secondary specialized education . . . . Of which: By groups of specializations and individual specializations, for which there is an additional demand . . .			

ANNEX XIII. List of posts for specialists with higher or secondary specialized education

Structural sub-divisions and posts	Total number of specialist posts	Of this number:			
		Posts to be filled by specialists with higher education		Posts to be filled by specialists with secondary specialized education	
		Number	Listed specialization	Number	Listed specialization
Final result					
Ratio of specialists to total workers employed					

ANNEX XIV. Extract from list of posts for specialists with higher and secondary specialized education by branch of the railway transport economy (central administration of signals and communications)

Structural sub-divisions and occupations	Level of education of specialist	Specialization
I. STAFF OF ADMINISTRATION AND ITS SUB-DIVISIONS		
(a) Staff of administration		
Chief of central administration, his deputies and head engineer	Higher	Automation, telemechanics and communications in railway transport
Chiefs of departments and their deputies	Higher	Automation, telemechanics and communications in railway transport Economics and organization of railway transport
Head book-keeper	Higher	Accountancy
Chief specialist, senior expert	Higher	Automation, telemechanics and communications in railway transport
Chief engineers, engineers, senior inspector	Higher	Automation, telemechanics and communications in railway transport Radio engineering Economics and organization of railway transport Computing and tabulating machines and devices

[continued overleaf]

ANNEX XIV (continued)

Structural sub-divisions and occupations	Level of education of specialist	Specialization
(b) Work-standards research centre		
Chief of centre, deputy-chief engineer, senior engineers and engineers	Higher	Automation, telemechanics and communications
Technicians	Secondary	Automation and telemechanics in railway transport Wire communications
(c) Signals and communications service of the railway administration		
Chief of service, his deputy and chief engineer	Higher	Automation, telemechanics and communications
Heads of departments, senior engineers and engineers	Higher	Automation, telemechanics and communications Radio communications and radio broadcasting Economics and planning of technical material supplies Economics and organization of railway transport
Travelling inspector for automation, telemechanics and communications	Higher	Automation, telemechanics and communications
Senior surveyor, surveyor	Higher	Automation, telemechanics and communications
Technicians	Secondary	Wire communications
(d) Signals and communications section of the railway department		
Chief of section and his deputy	Higher	Automation, telemechanics and communications
Senior engineers and engineers	Higher	Automation, telemechanics and communications
Technicians	Secondary	Automation and telemechanics Wire communications
II. LINE ORGANIZATIONS AND INDUSTRIAL ENTERPRISES		
(a) Signals and communications divisions		
Chief of division, his deputy and chief engineers	Higher	Automation, telemechanics and communications
Assistant chief of division - executive staff	Secondary	Automation, telemechanics and communications
Head book-keeper	Secondary	Wire communications
Head book-keeper, senior book-keeper, ranking with head book-keeper	Higher or secondary	Accountancy
Head of telegraph-telephone office servicing railways administration	Secondary	Wire communications
Head of mechanized 'ramp'	Higher	Automation, telemechanics and communications
Foreman of mechanized 'ramp'	Secondary	Automation and telemechanics Wire communications
Chief engineer and engineers	Higher	Automation, telemechanics and communications Radio communications and radio broadcasting
Senior electrical engineers	Higher or secondary	Automation, telemechanics and communications Radio communications and radio broadcasting
Electrical engineers	Secondary	Automation, telemechanics and communications Wire communications Radio communications and radio broadcasting
Economist	Higher	Economics and organization of railway transport

Structural sub-divisions and occupations	Level of education of specialist	Specialization
Senior evaluator	Higher	Automation, telemechanics and communications Economics and organization of railway transport Radio communications and radio broadcasting
Evaluators	Secondary	Automation, telemechanics and communications Planning in railway transport Wire communications
Senior technicians, technicians	Secondary	Automation and telemechanics Wire communications
(b) Mobile electrical engineering laboratories for signals and communications		
Chief of laboratory	Higher	Automation, telemechanics and communications
Senior engineers and engineers	Higher	Automation, telemechanics and communications
Technicians, electrical engineers	Secondary	Automation and telemechanics Wire communications
(c) Mobile electrical engineering works and workshops		
Chief of works (group I workshops)	Higher	Automation, telemechanics and communications
Deputy-chief of works (group I workshops)	Higher	Technology of machinery construction, metal-cutting lathes and tools
Chief engineer and engineers	Higher	Automation telemechanics and communications
Chief of remaining groups of workshops	Secondary	Automation and telemechanics
Chief of the technical production section of the works	Higher	Automation, telemechanics and communications
Heads of shops and foremen	Secondary	Processing of metals by cutting
Head mechanic, head technologist	Higher	Technology of machine construction, metal-cutting lathes and tools
Head book-keeper	Secondary	Accountancy
Engineer-economist	Higher	Economics and organization of railway transport
Job evaluators	Secondary	Planning in railway transport Automation and telemechanics
[. .]		
(f) Works of the Transsignalsvyazzavody trust		
Chief of works and head engineer	Higher	Automation and telemechanics Technology of machine construction, metal-cutting lathes and tools Automation, telemechanics and communications
Deputy-chief of works	Higher	Economics and planning of technical material supplies Automation, telemechanics and communications
Chiefs of departments and their deputies (technical production planning, labour wages and specialist staff, technical supervision, designing, technical material supplies and sales)	Higher	Economics and planning of technical material supplies Automation and telemechanics Technology of machine construction, metal-cutting lathes and tools Automation, telemechanics and communications Economics and organization of railway transport Economics and organization of machine-building industry Economics of labour
Deputy-chief of technical materials supply department and sales	Secondary	Merchandizing, supplies of technical materials and sales

[continued overleaf]

ANNEX XIV (continued)

Structural sub-divisions and occupations	Level of education of specialist	Specialization
Head mechanic	Higher	Technology of machine construction, metal-cutting lathes and tools
Chief power engineer	Higher	Electric power supply of industrial enterprises and cities
Chief designer	Higher	Automation and telemechanics
Head metallurgist	Higher	Casting of ferrous and non-ferrous metals
Chief of assembly shop and his deputy	Higher	Automation and telemechanics Automation, telemechanics and communications
Chief of assembly-line shop and of communications equipment, and their deputies	Higher	Automation, telemechanics and communications
Chief of casting shop	Higher	Casting of ferrous and non-ferrous metals
Deputy-chief of casting shop	Secondary	Casting of ferrous and non-ferrous metals
Head of blacksmith shop	Higher	Machinery and technology of pressure-processing of metal
Deputy-chief of blacksmith shop	Secondary	Forging and stamping
Chiefs of machine, tool, procurement and mechanical repair shops	Higher	Technology of machine construction, metal-cutting lathes and tools
Deputy-chiefs of above shops	Secondary	Processing of metals by cutting
Chief of coatings shop	Secondary	Technology of electro-chemical products Technology of inorganic substances
Chief of building repairs shop and his deputy	Secondary	Industrial and civil building construction
Senior dispatchers	Higher	Automation and telemechanics Automation, telemechanics and communications
Dispatchers	Secondary	Automation, telemechanics and communications
Head book-keeper	Higher or secondary	Accountancy
Deputy-head book-keeper, senior book-keeper	Secondary	Accountancy
Chief engineers and engineers	Higher	Electrical supplies of industrial enterprises and cities Casting of ferrous and non-ferrous metals Technology of machine construction, metal-cutting lathes and tools Radio engineering Machinery and technology of pressure-processing of metals Industrial and civil building construction Economics and organization of machinery building industry Economics and organization of railway transport Machinery and technology of casting works Automation and telemechanics Electrical engineering communications equipment Economics and planning of technical material supplies Economics of labour
Senior technological engineers, technological engineers, senior design engineers, design engineers	Higher	Technology of machinery construction, metal-cutting lathes and tools Machinery and technology of casting production

Structural sub-divisions and occupations	Level of education of specialist	Specialization
Senior technological engineers, technological engineers, senior design engineers, design engineers (continued)	*Higher*	Machinery and technology of pressure-processing of metals Automation and telemechanics Automation, telemechanics and communications Electricity supplies for industrial enterprises and cities Technology of inorganic substances Technology of electro-chemical products
Senior economic engineers and economic engineers	Higher	Economics and organization of railway transport Economics and organization of machinery construction industry Economics of labour
Senior technological technicians, technological technicians, design technicians, senior technicians and technicians	Secondary	Processing of metals by cutting Casting of ferrous metals Forging and stamping Manufacture of automation and telemechanical equipment Planning in railway transport Planning in communications enterprises
Senior commodity experts and commodity experts	Secondary	Merchandizing, technical material supplies and sales
Chiefs of laboratories, senior engineers and engineers	Higher	Technology of inorganic substances Automation and telemechanics Technology of electrochemical products Automation, telemechanics and communications Casting of ferrous and non-ferrous metals Technology of machinery construction, metal-cutting lathes and tools Radio engineering
Senior laboratory assistants in works- and shop-laboratories	Secondary	Technology of inorganic substances Production of automation and telemechanical apparatus
Senior foremen and foremen (supervisory)	Secondary	Casting of ferrous metals Production of automation and telemechanical equipment Technology of electrochemical products Welding production Technology of inorganic substances Tool production Technology of paints and varnishes Electrical equipment of industrial enterprises and installations Industrial and civil building constructions Technical operation and repair of motor vehicle transport Forging and stamping
Job evaluators	Secondary	Planning in railway transport
Mechanics	Secondary	Processing of metals by cutting

ANNEX XV. Model form for estimating the number of pupils, classes, teachers and supervisor-teachers in general education schools

ITEM	School year 19../19.. (base year)			School year... (first year of plan)			School year... (last year of plan)		
	Total	Towns	Villages	Total	Towns	Villages	Total	Towns	Villages

N.B. In practice, all the items below are placed in the first column

A. Number of pupils in general education schools for all types . . .

Grades 1 to 4 . . . .
Of which:
Grade 1 . . . .
Grade 2 . . . .
Grade 3 . . . .
Grade 4 . . . .

Grades 5 to 8 . . . .
Of which:
Grade 5 . . . .
Grade 6 . . . .
Grade 7 . . . .
Grade 8 . . . .

Grades 9 and 10 . . . .
Of which:
Grade 9 . . . .
Grade 10 . . . .

Composition

1. Primary, eight-year and secondary schools (not including boarding-schools, extended day-care schools, schools for young industirial workers) . . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

2. Boarding-schools . . . .

Grade 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

3. Extended day-care schools . . .

Grade 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

4. Schools for young industrial workers . . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

5. Schools for young agricultural workers . . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

B. Number of classes and one-teacher classes per week in forms in general educational schools . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

Composition

1. Primary, eight-year and secondary schools (not including boarding-schools, extended day-care schools, schools for young workers and peasants) . . . .

Of which:
Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

2. Boarding-schools . . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

3. Extended day-care schools . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

4. Schools for young industrial workers . . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

5. Schools for young agricultural workers . . . .

Grades 1 to 4 . . . .
Of which:
Grade 1, etc. . . . .

C. Average number of pupils per grade in all types of general educational schools . . . .

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 and 10 . . . .

1. Primary, eight-year and secondary schools (not including boarding-schools, extended day-care schools, schools for young workers and peasants) . . . .

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 to 11 . . . .

2. Boarding-schools . . . .

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 and 10 . . . .

3. Extended day-care schools . . .

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 and 10 . . . .

4. Schools for young industrial workers . . . .

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 and 10 . . . .

5. Schools for young agricultural workers . . . .

D. Number of teachers and supervisor-teachers (including principals and assistant principals giving lessons) . . . .

Grades 1 to 4 . . . .
Having attended:
Higher educational establishments
Higher teacher-training schools or equivalent level . . . . .
Secondary teacher-training schools . . . .

Grades 5 to 8 . . . .
Having attended:
Higher educational establishments
Higher teacher-training schools or equivalent level . . . . .
Secondary teacher-training schools . . . .

Composition:

1. Primary, eight-year and secondary schools (not including boarding-schools, extended day-care schools, schools for young workers and peasants) . . . . . .

Grades 1 to 4 . . . .
Having attended:
Higher educational establishments, etc. . . . .

2. Boarding-schools . . . . . .
Of which:
Teachers . . . .

Grades 1 to 4 . . . .
Having attended:
Higher educational establishments, etc. . . . .
Supervisor-teachers . . . . .

Grades 1 to 4 . . . .
Having attended:
Higher educational establishments, etc. . . . .

ANNEX XV (continued)

3. Extended day-care schools . . .

Of which:

Teachers . . . .

Grades 1 to 4 . . . .
  Having attended:
  Higher educational establishments, etc. . . . .
  Supervisor-teachers . . . .

Grades 1 to 4 . . . .
  Having attended:
  Higher educational establishments, etc. . . . .

4. Schools for young industrial workers . . . .

Teachers . . . .

Grades 1 to 4 . . . .
  Having attended:
  Higher educational establishments, etc. . . . .

5. Schools for young agricultural workers . . . .

Teachers . . . .

Grades 1 to 4 . . . .
  Having attended:
  Higher educational establishments, etc. . . . .

ANNEX XVI. Model form for estimating the abolute demand for teachers and supervisor-teachers in general educational schools for school year ....

Grade groups	Number of pupils at beginning of school year	Average number of pupils per class	Number of classes	Average number of lessons per class per week as per curriculum	Average number of lessons per class per week given the divisions of classes into groups	Total number of lessons per week	Average work-load per teacher per week	Number supervisor-teachers per class	Absolute demand for teachers and supervisor-teachers	Of which:			
										Higher	Subjects	Secondary specialized institutes	Subjects

N.B. In practice, all the items below are placed in the first column headed 'Grade groups'

A. Teachers in primary, eight-year and secondary schools, including boarding-schools and extended day-care schools

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 and 10 . . . .
  Grades 1 to 10. . . . .
    Total . . . .

B. Teachers in schools for young workers and peasants

Grades 1 to 4 . . . .
Grades 5 to 8 . . . .
Grades 9 and 10 . . . .
  Grades 1 to 10. . . . .
    Total . . . .

Teachers, total . . . .

C. Supervisor-teachers in boarding-schools and extended day-care schools

Boarding-schools
  Grades 1 to 7 . . . .
  Grades 8 to 10. . . . .
    Boarding-schools, total . . .
Extended day-care schools
  Groups in grades 1 to 4. . . . .
  Groups in grades 5 to 8. . . . .
    Total . . . .

Supervisor-teachers, total . .

ANNEX XVII. Model form for estimating additional demand for teaching staff in general educational schools, including schools for young workers and peasants

ITEM [a]	Number available at beginning of school year (base year)			School year (first year of plan)			Etc. by year	School year (last year of plan)		
	Total	Teachers	Supervisor-teachers	Total	Teachers	Supervisor-teachers		Total	Teachers	Supervisor-teachers

N.B. In practice, all the items below are placed in the first column

A. Grades 1 to 4

1. Absolute demand for teachers and supervisor-teachers at beginning of school year
2. Additional demand due to increase in population
3. Additional demand to compensate for withdrawals
4. Total additional demand

B. Grades 5 to 10

1. Absolute demand for teachers and supervisor-teachers at beginning of school year
2. Additional demand due to increase in population
3. Additional demand to compensate for withdrawals
4. Total additional demand

C. Total for grades 1 to 10

1. Absolute demand
2. Total additional demand

---

a. The total additional demand for teachers is shown as a total figure. Details of specializations are given in an annex to the form

ANNEX XVIII. Model form for estimating additional requirements in specialists, classified by individual branch of national economy (Base year: 1963)

ITEM	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Number of workers, technicians and employees (in thousands)	100	105	110	115	120	125	130	135	140	145	150	155	160
Percentage of specialists in relation to all workers	9.6	9.8	10.0	10.4	10.8	11.2	11.6	12.0	12.4	12.8	13.2	13.6	14.0
Number of posts to be filled by specialists (in units)	9 600	10 300	11 000	11 960	12 960	14 000	15 080	16 200	17 360	18 560	19 800	21 000	22 400
Of whom:													
Specialists with higher education	2 600	2 800	2 000	3 300	3 600	3 900	4 200	4 500	4 800	5 100	5 400	5 700	6 000
Specialists with secondary specialized education	7 000	7 500	8 000	8 600	9 360	10 100	10 880	11 700	12 560	13 460	14 400	15 380	16 400
Additional requirement in specialists with higher education (in units)													
(a) To cover increased number of posts		200	200	300	300	300	300	300	300	300	300	300	300
(b) To replace workers lost (assuming 3% annually)		78	84	90	100	108	117	126	135	144	153	162	171
Total		278	284	390	400	408	417	426	435	444	453	462	471
Sub-division by groups of specialists													
Additional requirements in specialists with secondary specialized education (in units)													
(a) To cover increased number of posts		500	500	660	700	740	780	820	860	900	940	980	1 020
(b) To replace workers lost (assuming 3% annually)		210	225	240	260	280	300	326	350	377	400	430	460
Total		710	725	900	960	1 020	1 080	1 146	1 210	1 277	1 340	1 410	1 480
Sub-division by groups of specialists													

ANNEX XIX. Model form of draft plan of admission and graduation of pupils by higher and secondary specialized educational establishments (for use by Union republics, ministries and USSR departments)

ITEM	1962 (base)				1963								1964/65 (draft plan for each year)				
	Total	Establishments			Plan				Expected fulfilment				Total	Establishments			
		Day tuition	Evening tuition	Correspondence courses	Total	Establishments			Total	Establishments				Day tuition		Evening tuition	Correspondence courses
						Day tuition	Evening tuition	Correspondence courses		Day tuition	Evening tuition	Correspondence courses		Total	Of whom from secondary school[a]		

N.B. In practice, all the items below are placed in the first column

Admissions to higher educational establishments . . . .
Of which:
For each group of specializations, with breakdown by specializations within each group[b] . . . .

Graduation from higher educational establishments . . . .
Of which:
For each group of specializations, with breakdown by specializations within each group[b] . . . .

Admissions to secondary specialized educational establishments . .
Of which:
For each group of specializations, with breakdown by specializations within each group[b] . . . .

Graduations from secondary specialized educational establishments
Of which:
For each group of specializations, with breakdown by specializations within each group[b] . . . .

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[a] Refers only to index figures of admissions to secondary specialized educational establishments of day-release students

[b] Breakdown by specializations within each group does not require confirmation by the USSR Council of Ministers

NOTE
For submission by councils of ministers of Union republics in respect of educational establishments subordinated to Union republic and republican ministries and departments. Ministries, state councils and USSR departments submit indices for the educational establishments under their control, as a whole, per ministry, state committee, USSR department and showing allocation by Union republics

ANNEX XX. Model form of draft plan showing number of students and pupils in higher and secondary specialized educational establishments per Union republic, ministry and USSR department (in units)

ITEM	1962 (base)	1963		1964/65 (draft plan for each year)
		Plan	Expected fulfilment	

N.B. In practice, all the items below are placed in the first column

Students in higher educational establishments . . . .
Of whom:
Day students . . . .
Evening students. . . . .
Correspondence course students. .

Pupils in secondary specialized educational establishments. . . . . .
Of whom:
Day students . . . .
Evening students . . . .
Correspondence course students. .

NOTE
For submission by councils of ministers of Union republics, as a whole for each republic, and showing separately therein ministries (committees) of higher and secondary specialized education and other ministries (departments) of republics. USSR ministries and departments submit index items as a whole for each USSR ministry or department, showing allocation by Union republics

ANNEX XXI. Report of higher educational establishments for 19. . school year (a)

Addressee (name and address) . .
Educational establishment . . . .
Ministry (department) . . . . . .
Address of educational establishment . . . .

For mechanical processing
1 2 3 4 5

To be sent by day-time and evening educational establishments and factory's higher technical institutes (VTUZy) on 10 July and by correspondence courses on 5 August to:
1. Their superior body.
2. The statistical administration of the locality where the establishment is situated.
3. The ministry (committee) of higher and secondary specialized education of the Union republic (only by institutes of other departments).

I. Changes in numbers of students for past scholastic year (b)

COURSE (c)	Number of students at start of scholastic year	Number of admissions during report period	Of whom transferred		Number of students who left during report period	Of whom:			Number of students completing course of training in the report period and presented diploma thesis or sat for state examinations	Number of persons who submitted diploma thesis or sat state examination but were given poor marks and also those who did not appear to present diploma thesis or sit for state examination on due date	Number of students at end of scholastic year, less transfers to next course (columns 1 2-5, 9 and 10)	According to curriculum		
			From other educational establishments	From other forms of tuition in the educational establishments		Failed to make progress	Transferred					Combined training with work in production	Did practical production work	Worked in established posts as wage-earners
							To other educational establishments	To other forms of training in the educational establishments						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14

N.B. In practice, in section I, all the items below are placed in the first column headed 'Course'

Course 1 (1) . . . .
Course 2 (2) . . . .
Course 3 (3) . . . .
Course 4 (4) . . . .
Course 5 (5) . . . .
Course 6 (6) . . . .
Year of graduation (7) . . . . .
Total (lines 1 to 7) (8) . . . . .

II. Results of examinations held during school year (b)

COURSE (c)	Number of students				Of whom		Number of students given poor marks in examinations on one or more subjects	Results of examinations				
	At start of spring examinations session	Obliged to sit for examinations	Attended examinations in all subjects	Sat for examinations in all subjects of the session curriculum	Have obtained 'excellent' in their marks	Have obtained 'excellent' and 'good' or 'good' only in their marks		Transferred to next course	Conditionally transferred but under obligation to make up academic arrears	Kept back for a second year	Completed theoretical studies and are allowed to present diploma thesis or sit for examinations	Rejected during examinations
	15	16	17	18	19	20	21	22	23	24	25	26

N.B. In practice, in section II, all the items below are placed in the first column headed 'Course'

Course 1 (9) . . . .
Course 2 (10) . . . .
Course 3 (11) . . . .
Course 4 (12) . . . .
Course 5 (13) . . . .
Course 6 (14) . . . .
Total (lines 9 to 14) (15) . . . .
Of this number
Have combined tuition with work on production (16) . . . .

ANNEX XXI (continued)

III. Results of production work done by students during the past school year

ITEM (b)	Number of students who combined tuition with work in production during scholastic year		Number of students who did practical production work	Number of students who worked in established posts as wage-earners
	Total	First-year students only		
	27	28	29	30

N.B. In practice, in section III, all the items below are placed in the first column

Total number (lines 18 to 24) (17)

Of this number
(a) Tuition combined with production work during sixteen months in first two courses and up to six months in senior courses (18) .
(b) Tuition combined with production work during one year in junior and one year in senior courses (19).
(c) Tuition combined with production work in specializations connected with seasonal nature work (20) .
(d) Tuition where students have done at least two years' industrial apprenticeship in a selected or kindred specialization, with, in senior courses, compulsory industrial practice or work during one year (21) . . . .
(e) Tuition in medical institutes for persons with secondary medical education and two years' work as specialized probationer, combining studies with specialized work in first two courses (22) . . . .
(f) Tuition in courses 1, 2 and 3, combined with specialized work during one year in senior specialization courses in higher educational establishments and universities with a large cycle of theoretical studies and a wide range of laboratory work (23) . . . .
(g) Tuition combined with work or industrial practice during one year in higher pedagogical, medical, law and literary institutes, art academies and also in specialization universities to which are admitted only persons who have done not less than two years' work in a probationary capacity (24) .

---

a. Indicate category of instruction: day, evening, correspondence, VTUZy
b. See explanatory note
c. Figures in parentheses indicate numbers of columns

EXPLANATORY NOTE

1. The report is to be compiled by higher educational establishments separately for day-time, evening and correspondence course tuition and for tuition in a factory's higher technical institute (VTUZ). Accelerated training groups will be shown along with principal departments.

2. The report will not include pupils studying in preparatory departments (courses).

3. Section I shows the changes in numbers of students from the start of the school year up to 1 July or, in the case of correspondence course institutes, up to 1 August. Column 1 'Number of students at start of scholastic year' shows the number of students included in formula 3-NK, both as a total figure and for each separate course; if the figures for number of students do not tally with the analogous figures in formula 3-NK, an explanation of this should be given in the report form. Column 5 'Number of students who left during report period will include data on the number of students who left the educational establishment for different reasons, including those rejected during the examination session (column 26); column 11 'Number of students at end of scholastic year, less transfers to next course' shows the number of students as at end of scholastic year. Figures in columns 1 plus those in column 2, minus those in columns 5, 9 and 10 should provide a figure equal to that shown in column 11.

Column 12 will show the number of day-department students who, according to the curriculum, have, in the course of the scholastic year, combined tuition with work in production; columns 13 and 14 show the number of advanced students who have done practical production work and also those who worked during the scholastic year in established posts and were paid wages where they worked.

Educational establishments (pedagogical, medical, musical, etc.) whose curricula provide for teaching, instead of industrial practice, will include in column 13 'Did practical production work' the number of students who took practice teaching. The figures in column 13 opposite the side-heading 'Total' should tally with the total figures shown in column 29 and those in column 14 should tally with those in column 30.

4. Section II presents a picture of the results of the examination held during the scholastic year. Day-time and evening educational establishments will show in section II particulars only of the results of the spring examinations, while correspondence course institutes will show the results for the whole scholastic year, i.e., irrespective of the dates when students sat for the examinations.

The figures in column 15 may be lower than the total of the figures in columns 11 and 26, because diploma holders have been included in column 11 or they may be equal to the total of the figures in columns 22 to 26, while the figures in column 17 will equal the total of the figures in columns 18 and 21, or they may be less than the total of the figures in these columns because students have not turned up to sit for their examinations - for adequate reasons, and have therefore been given marks of 'unsatisfactory' and so are shown in column 21.

5. Section III 'Results of production work done by students during the past scholastic year' will be completed only by

[continued overleaf]

ANNEX XXI (continued)

day departments of higher educational establishments. Institutes must, when showing the distribution of students by type of tuition received be guided by Order No. 241 of the Ministry of Higher and Secondary Specialized Education of the USSR, dated 14 August 1961, on 'the classification of specializations in higher educational establishments by type and period of tuition'.

If curricula make provision for practice teaching (in place of industrial training), higher educational establishments will show in column 29 the number of students who have in the course of the scholastic year done practice teaching.

Rector

ANNEX XXII. Report of a technicum and other secondary specialized educational establishments (as at beginning of 19../.. school year)

Addressee
(name and address)
Exact name of educational establishment
Sovnarkhoz, ministry (department)
Postal address of educational establishment
Date on which the report is sent

Report is compiled as of 1 October and sent not later than 5 October to:
1. The local statistical administration.
2. The ministry (committee) of higher and secondary specialized education of the Union republic.
3. Establishments not forming part of the system of the USSR Ministry of Higher and Secondary Specialized Education, to their superior body.

For mechanized processing
1 2 3 4 5

I. Distribution of pupils by course and specialization at 1 October 19.. (a)

Departments, specializations as per current list	List number of special-izations	Number of admis-sions under plan total (b)	Courses						Total number in all courses (total 2-7)	Of whom females	Number graduated		
											Number graduated from 1/1/19.. to 1/1/19..	Number expected to graduate	
			I	II	III	IV	V	VI				from 1/10/19.. to 1/1/19..	from 1/1/19.. to 1/1/19..
		1	2	3	4	5	6	7	8	9	10	11	12
1. Principal departments													
. . . .													
. . . .													
. . . .													
. . . .													
Total													
2. Groups of secondary school leavers													
. . . .													
. . . .													
. . . .													
. . . .													
Total													
General total (1 + 2)													

Included in total number:
(a) Pupils detailed by enterprises, builders, sovkhozes, kolkhozes and other bodies in compliance with resolution of USSR Council of Ministers dated 18 September 1959 (01) (c)
(b) Repeaters (02)
(c) Pupils receiving a grant from scholarship fund (03)
(d) Pupils receiving a grant from enterprises, builders, sovkhozes, kolkhozes and other bodies (04)

Ia. Further information concerning admissions

	Total	Of which	
		Principal departments	Groups of secondary school leavers
Entry applications received			
Sat for examinations			
Passed			
Admitted for first year			

---

a. Not counting pupils admitted to complete senior courses
b. 1. Total number admitted included pupils who in current year completed (excluding young workers and peasants)
(i) grades 7-8 of eight-year and secondary schools
(ii) grades 10-11 of secondary schools
2. Number admitted with at least two years' experience of practical work
c. Figures in parentheses represent list numbers of lines or columns

II. Teaching staff

	Total (columns 17-20)	Of which:						
		Have an education level of:			Have had teaching experience of:			
		Higher	Incomplete higher	Secondary	Under 5 years	5-10 years	10-25 years	Over 25 years
	13	14	15	16	17	18	19	20
Total (11)								
Including established teachers (12).								

III. Number of pupils by sex and age

	Age at 1 January 19..					Total (columns 21-25)
	14 and under	15 years	16 years	17 years	18 and over	
	21	22	23	24	25	26
Number of pupils at beginning of school year 19../.. (21)						
Of whom males (22)						

IV. Social status of pupils

Status	Total number of pupils	Of whom new entrants
	27	28
Total		
Of whom:		
Workers and workers' children (31).		
Kolkhoz workers or their children (32).		
Employees or employees' children (33).		

V. Industrial training of pupils as at 1 October 19.. (a)

	Total	Of whom	
		Trained in enterprises, institutions and organizations	Trained in industrial apprenticeship section of the educational establishment
	29	30	31
Number of pupils undergoing practical training to qualify as a worker (41)			
Number of pupils combining work in production with training (by correspondence or in evening courses) (42).			
Number of pupils undergoing industrial or academic training (43). . .			

---

a. Form not to be completed by evening and correspondence course institutes

VI. Composition of pupils by nationality

Nationality	Total number of pupils	Of whom females
	32	33
Russians (60)		
Ukrainians (61)		
Byelorussians (62)		
Uzbeks (63)		
Kazakhs (64)		
Georgians (65)		
Azerbaidjanis (66)		
Lithuanians (67)		
Moldavians (68)		
Latvians (69)		
Kirghiz (70)		
Tadzhiks (71)		
Armenians (72)		
Turkmens (73)		
Estonians (74)		
Bashkirs (75)		
Buryats (76)		
Nationalities of Daghestan (77)		
Kabardins (78)		
Balkarians (79)		
Karelians (80)		
Komis (81)		
Maris (82)		
Mordovians (83)		
Ossetians (84)		
Tartars (85)		
Udmurts (86)		
Chechenis (87)		
Ingutsi (88)		
Chuvash (89)		
Yakuts (90)		
Jews (91)		
Karakalpaks (92)		
Abkhazians (93)		
Kalmyks (94)		
etc.		
Total (lines 60 to 94, etc.)		

[continued overleaf]

ANNEX XXII (continued)

VII. Number and utilization of school-laboratory buildings and hostels (area space in square metres)

ITEM	Total area of buildings	Of which area rented	Total area			
			Classrooms	Auxiliary teaching area	Ancillary	Living quarters
	34	35	36	37	38	39

Total (101) . . . .
Of which:
Classrooms and laboratories (102).
Hostel accommodation (103). . . .
Number of pupils living in hostel(104)
Number of pupils in private quarters paid for by school or institute (105) .
Number of groups of pupils (in all courses) (106) . . . .
Number of shifts in which lessons are given (107) . . . .

EXPLANATORY NOTE

The report will be compiled by all educational establishments to show the state of affairs as at 1 October, irrespective of the date on which the particular establishment's scholastic year begins, showing separately data for day, evening and correspondence course departments. Educational establishments which have branches (UKP) will append to the report a list of them, set out as follows: name of branch, location, total number of pupils, including fresh enrolment in 19.. and leavers in 19.. (by specialization).

The social condition of pupils is determined on the basis of documents submitted on entering the educational establishment and available in the personal files.

The social condition of persons admitted to the educational establishments without evidence that they have had experience of practical work is to be determined by the social condition of the parents.

The description and number of a specialization (section I) must tally exactly with the current operative list of specializations.

Agricultural educational establishments giving tuition by correspondence, in which pupils are enrolled during the months of October-December and later, will include in the number of pupils admitted the whole number actually enrolled for the period from the previous 1 October to the current 1 October.

Section VII, showing 'Number and utilization of school-laboratory buildings and hostels', should be completed from data contained in basic documents of each educational institute. Under 'Total area of buildings' will be included the area covered by blocks of school buildings, hostels, ancillary and other premises, owned or rented by the institute.

The teaching area will include that occupied by the premises directly used for teaching purposes, e.g., lecture rooms, laboratories for teaching and scientific-research purposes, classrooms, draughtsmen's offices and rooms for course and diploma project work, students' workshops, demonstration, assembly and experimental theatres, games rooms.

The auxiliary teaching area will comprise premises used for work that is auxiliary or ancillary to the teaching given, e.g., teachers' studies, cloak-rooms, administrative offices, social club rooms, libraries, school assembly halls, archives, etc.

'Living quarters' covers the area occupied by residential hostels for pupils. Refreshment rooms, medical centres, corridors, kitchens, rooms used for study or lessons will be shown as 'ancillary'.

The total of columns 36, 37, 38 and 39 should be equal to column 34.

ANNEX XXIII. Additional requirements in specialists with higher and secondary specialized education for the year 19.., and plan proposals for distribution by Union republic, ministry and department of the USSR

Name and number of individual specializations and groups of specializations	Additional requirements in specialists		From which establishments in Union republics, ministries and services of the USSR would it be advisable to obtain specialists? (indicate number)
	Total	This figure includes students finishing studies without terminating work	

N.B. In practice, the items below are placed in the first column

A. With higher education . . . . .
Total . . . .
Including:
1. Geology and prospecting of mineral deposits . . . .
Total
0103. Geology and prospecting of oil and gas deposits, etc. (by individual specializations and groups of specializations for which there is need in specialists) . . . .
B. From secondary specialized education
Total . . . .

ANNEX XXIV. Plan for drafting specialists graduating from higher educational establishments for a sovnarkhoz, ministry, or department of the RSFSR and the USSR, or for the council of ministers of a Union republic (for the year 19...)

ITEM	Number of specialists drafted	Graduated from VUZy				
		RSFSR Ministry of Higher and Secondary Specialized Education	RSFSR Ministry of Agriculture	RSFSR Ministry of Education	Council of Ministers of Ukrainian SSR	Etc.

N.B. In practice, the items below are placed in the first column

Total . . . .

Of whom:

(a) Specialists from dependent educational establishments . . . .

(b) Specialists from educational establishments of other ministries and departments . . . .

(c) Distribution by specialization. .

ANNEX XXV. Model form for the plan of allocating young specialists

Name of educational establishment of specialist

Name of ministry or service

Date (month, year)

Current percentage of educational establishment

No. in

Signature of head book-keeper

TO BE COMPLETED BY YOUNG SPECIALIST

Surname, first name, and patronymic

Sex Date of birth

Nationality

Party membership

Family circumstances

Permanent address (parents' address)

Specialization of graduate

ALLOCATED TO:

Ministry (department), sovnarkhoz, provincial (regional) executive committee, provincial (regional) administration

Name of enterprise

Location of enterprise (region, province, republic, autonomous republic, railway line)

Post

Salary

Housing offered

Does graduate accept post to which directed? (indicate reasons for refusal)

Signature of specialist

ANNEX XXVI. Wording of a certificate signed and delivered by the ministry (department, sovnarkhoz or regional or provincial administration)

CERTIFICATE NO.

COMRADE (surname, first name and patronymic in full)

HAVING GRADUATED ON 19

EDUCATIONAL ESTABLISHMENT (full name)

SPECIALIZATION

IS TO BE AT THE DISPOSAL OF (name and address of enterprise or institution)

FOR WORK IN THE POST OF

WITH A MONTHLY SALARY OF

TYPE OF HOUSING PROVIDED

DATE OF ARRIVAL

Deputy-minister
(director of department)

Signature and date

Chief of branch administration

Signature and date

Addenda

Some figures for the year 1966/67, which have been published since the completion of this report, are given below to demonstrate the continuing growth of the Soviet educational system. They should be read as complementing the information in the relevant tables.

Table 1 (page 21)

	Number of pupils (in thousand) 1966/67	Number of pupils per 10 000 of population 1966/67
General education schools of all types	48 168	2 040
Vocational-technical schools; factory schools	1 960	86
Secondary specialized educational establishments	3 979	169
Higher educational institutions	4 123	175
Total	58 230	2 470

Table 16 (page 96)

	1966/67
Number of pupils (in thousands)	48 168
In 1 to 4	20 576
In 5 to 7	20 003
In 8 to 11	7 294
In other schools	295

Table 18 (page 98)

School year	Number of students by grade groups (a)				Total number of schools (b)
	1 to 4	5 to 7	8 to 11	Total	
1966/67	66	1 467	3 108	4 641	21 903

Table 32 (page 128)

The figures for 1966 are as follows:

	Higher educational establishments	Secondary specialized educational establishments
Number of establishments	767	3 980
Number of students (in thousands)	4 122.5	3 978.8
Admissions (in thousands)	897.0	1 211.0
Graduates (in thousands)	431.9	687.3
Number of specialists	5 227	7 697

[continued overleaf]

Table 35 (page 131)

	1966
Total number of graduates (in thousands) of which:	431.9
Industry and construction	149.5
Transport and communications	20.2
Agriculture	35.0
Economics and law	35.1
Public health, physical culture and sport	32.5
Education	155.1
Arts and cinema	4.5

Table 36 (page 131)

	1966
Total number of graduates (in thousands) of which:	687.3
Industry and construction	271.4
Transport and communications	57.5
Agriculture	92.7
Economics and law	91.7
Public health, physical culture and sport	79.9
Education	75.1
Arts and cinema	14.4

Table 41 (page 136)

	1 December 1966
Number of specialists with higher education in the national economy	5 227
Engineers	1 789
Agricultural and livestock specialists, veterinary surgeons and sylviculturists	323
Economists and statisticians	333
Commodity experts	39
Jurists	88
Doctors (excluding dentists)	519
Teachers and education specialists; librarians and cultural-educational workers	1 956
Number of specialists with secondary education in the national economy	7 697
Technicians	3 145
Agricultural and livestock specialists, veterinary assistants and technicians	500
Statisticians and planners	637
Commodity experts	251
Jurists	17
Medical workers (including dentists)	1 536
Teachers, librarians and cultural-educational workers	1 329

The above figures are taken from:

Ministry of Education of the USSR, Public Education in the Soviet Union in the School Year 1966/67, Moscow, 1967

Central Statistical Administration, Ministry of Education of the USSR, The Soviet Union after Fifty Years, Moscow, Statistika, 1967

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Introduction

The sending of a mission to the Soviet Union by the International Institute for Educational Planning constituted one of the phases in the preparation of the case study undertaken by IIEP on the Soviet experience in the planning of its educational system. The twofold purpose of that mission has been explained by Philip H. Coombs in his foreword to this publication.

The members of the mission were selected because of their special knowledge of the problems of the Soviet Union or because of their own experience and responsibilities in educational planning. The composition of the mission is appended at the end of this study.

Each member of the mission was given the opportunity to increase his knowledge of educational planning in the Soviet Union or to make his first contact with those problems by examining the initial text prepared by the Soviet writers, which had been translated into English and French and distributed to them. Moreover, almost all of the members assembled at the IIEP headquarters in Paris before their departure for the Soviet Union, and participated on 15, 16 and 17 September 1964 in a preparatory seminar during which a number of major subjects relating to the economic and social life of the Soviet Union were examined and discussed, including the development of its educational system. During the seminar, the members of the mission were already beginning to define the points on which, subject to the information resulting from its work on the spot in the Soviet Union, they intended to concentrate most particularly their study.

The working programme of the mission was arranged in the Soviet Union by the National Commission of the USSR for Unesco on the basis of the proposals sent forward by IIEP. The programme was planned to give the members of the mission the most complete and definite information possible: (a) on the administrative and financial operation and the organization of instruction in the various types of educational institutions; (b) on the organization of educational administration at all levels, from the district officials to the ministries and federal state committees; and (c) on the process of preparing and executing educational development plans and the respective roles of the different administrative levels, including in particular the Gosplan and the Ministry of Finance of the Soviet Union.

Owing to the wide scope of the problems to be studied and the great number of agencies to be visited, the mission decided to conduct jointly the visits and meetings which were of interest to all and to divide up the visits and interviews on subjects of more individual character according to their respective specializations. Visits and interviews of this second type were usually added during the course of the mission to the basic programme established on their arrival. The organization of these supplementary events, responding to desires expressed by members of the mission, was made possible only by the high degree of understanding shown by the National Commission of the USSR for Unesco, and especially by its late vice-chairman, Alexandr A. Petrov - to whose memory we pay tribute - and all the Soviet governmental authorities.

As shown by the itemized time-table, given in annex II, of its four weeks in the Soviet Union - from 18 September to 18 October 1965 - the IIEP mission conducted forty-one visits and meetings by the group as a whole and twenty-eight by a part of its members.

On their arrival and more extensively at the end of their visit, the mission met the Soviet group of writers and thus had the opportunity to make verbal suggestions for possible additions to certain parts of the initial draft of their study. These suggestions were later clarified in written form and sent back, after the mission's return to Paris, to the Soviet writers, who took them fully into account in the final version of their study which now precedes and forms the essential part of this publication.

In respect of the contribution of the mission itself, it could not be expected to cover completely the problems of educational planning in the Soviet Union without inevitably making needless repetitions and duplications of effort with regard to the basic study prepared by the Soviet writers, and in view of the fact that, as we have said, the members had taken the opportunity to ask the Soviet writers to incorporate the additions and supplements which they considered of value, the mission decided at its last meeting in Moscow to limit its own comments to the following four subjects: (a) levels of authority and decision in organizing and planning education in the Soviet Union; (b) the development of general polytechnical training schools; (c) the development of the educational system and manpower requirements in the Soviet Union; (d) economic and financial aspects of education in the Soviet Union.

Even limited to these four points, the mission's report obviously deals with subjects which the Soviet writers themselves have approached, as will be seen from the frequent references to their work which are made in the following pages. However, there is no real duplication between the two parts of the work, inasmuch as the comments express, as was expected of them, the reflexions and findings of external observers concerning some of the major problems of educational planning in the Soviet Union and attempt, moreover, to accent aspects of the Soviet experience which from their point of view are particularly likely to strike the attention of international readers.

Having completed their work, all members of the IIEP mission join with the Director, Philip H. Coombs, in thanking the Soviet authorities for the cordial reception and the constant assistance which they received and the generous hospitality which they enjoyed in all their movements.

As head of mission, I wish to extend my personal thanks to every one of the members. In spite of the fatigue which naturally resulted from so heavy a programme, their enthusiasm for the study in which they were engaged never faltered. The mission's report - although its final editing involves only the Institute's responsibility, as Mr. Coombs mentioned in the foreword - is a joint effort. However, we feel it a duty to express our special appreciation to Professors Suchodolski, Eason and Kaser, who very kindly rendered assistance which I consider essential, in their respective fields in the editing of Chapters 2, 3 and 4 of the following text.

Raymond Poignant

Chapter 1

Levels of jurisdiction and decision-making in educational planning and organization

Section I

CONSTITUTIONAL BASIS OF EDUCATIONAL ORGANIZATION AND THE ROLE OF THE COMMUNIST PARTY

A. CONSTITUTIONAL BASIS OF EDUCATIONAL ORGANIZATION

The powers of organization and administration of public education in the Soviet Union are divided among government organs at all levels: the Union, Union republics and autonomous republics, regions ('oblast') and assimilated units[1], urban and rural districts ('raions'), cities and rural areas.

This division of powers is based to a large extent on the Soviet constitution itself and for the rest on the legislation of the Union and the republics, which take into consideration local characteristics. We shall analyse first the content of the provisions of the USSR constitution which deal with the organization of education.

1. Powers of the Union

Article 121 of the constitution of 5 December 1936, which is included in Chapter X, 'Fundamental rights and duties of citizens', lays down the principle of the 'right to education' and lists specific measures designed to ensure this right[2]; however, no light is thrown here on the problem of respective jurisdictions. The key provisions on this problem are to be found in Chapter XI, 'The State structure', and particularly in articles 14 and 15.

Article 14 of the constitution lists the jurisdiction reserved for the Union; in addition to the subjects which correspond to the usual powers of a federal state (diplomacy, defence, foreign trade etc.) are to be found functions peculiar to a socialist state, in particular, the determination of the national economic plans of the USSR, the approval of the single budget of the State and general control of currency and credit.

Paragraph t[3] of article 14 contains a direct reference to the authority of the Union in matters of education under the heading 'establishment of the basic principles in the sphere of education ...'.

However, by virtue of other paragraphs of article 14, particularly paragraph j ('determination of the national economic plans of the USSR') and paragraph k ('approval of the consolidated state budget of the USSR ... fixing taxes and revenues that go to the Union, republican and local budgets...'), the Union also enjoys the power of decision in planning, of which educational development plans are an integral part, as well as in the field of the budget.

The jurisdiction of the Union of the organization and development of education. This is extremely broad. Thus, according to article 14 of the constitution, the general powers of the Union in the educational sphere are exercised on four main levels:

1. Definition of the general framework (the 'basic principles') of the organization of the system of 'public education' for the whole of the USSR. This power may be exercised either by means of laws adopted by the Supreme Soviet of the USSR[4] or by means of decrees adopted by the Council of Ministers of the USSR[5]; in principle,

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[1] Autonomous territories, autonomous regions.

[2] 'The citizens of the USSR have the right to an education. This right is ensured by the compulsory general schooling of eight years; by the wide development of general and polytechnical secondary instruction, of vocational and technical training, and of higher and specialized secondary education on the basis of joint development of education, life and production; by the development of evening courses and correspondence; by the gratuity of all forms of instruction; by the system of state scholarships, free instruction in the mother tongue in the schools, and the organization of free vocational, technical and agricultural instruction for the workers in factories, "sovkhozes" and "kolkhozes".'

[3] Russian text of the constitution.

[4] E.g., the law of 24 December 1958, 'on strengthening the ties between school and life and the further development of the public education system in the USSR'.

[5] For example: the decree of 16 May 1934, concerning the organization of the system of schools of general education, the decrees of 15 July 1943 and 6 July 1944 concerning the establishment of schools for working youth and schools for rural youth.

according to article 66 of the constitution, the Council of Ministers can take action only in the form of decisions in execution of the laws.

2. General organization and control of educational institutions producing skilled labour and the specialists required for the implementation of economic plans. The constitution contains no explicit provisions on this point, but the very broad powers exercised by the Union in this field are based, it would seem, on its overriding jurisdiction in the field of national economic planning.
3. Determination of educational development targets. These targets are included in the economic development plans prepared for the whole of the USSR. The role of the Union and that of other governmental levels in educational planning are analysed in detail further on.
4. Allocation of financial resources to educational institutions. The financing of educational expenditures is provided mainly by the consolidated state budget of the USSR adopted by the Supreme Soviet, of which the budgets of the Union republics are an integral part.

   It follows that the financial jurisdiction of the Union authorities covers every type of institution, whatever be the level of the administration (Union, republics, territories, regions, districts, cities, rural areas) to which it is subordinate. Within the over-all budget appropriation authorized by the Union, the republics, territories, etc., finance the educational institutions for which they are responsible.

The role of the Union in the direct administration of educational institutions. This role is very limited. Aside from its considerable general powers, the Union has the power of direct administration of all educational institutions administratively subordinate to the 'all-Union ministries'.

It will be recalled, in this connexion, that chapter V of the 5 December 1936 constitution draws a distinction, among the organs of state administration of the USSR, between two types of ministries:

1. The all-Union ministries. They 'direct the branch of state administration entrusted to them either directly or through bodies appointed by them' (article 77 of the constitution).

   No ministry specializing in the problems of education is included in the list of 'all-Union ministries'; for this reason, the direct administration of educational institutions by administrative organs of the Union is confined to those institutions which, for special reasons, are directly subordinate to certain all-Union ministries (the Ministry of Railways, for example).

   Taken together, these institutions represent but a very small part of the Soviet school and university system and, in 1964, the amounts included in the budget of the Union itself corresponded to only about 5.7 per cent of total public expenditure on education.
2. The 'Union-republican' ministries. They direct the branch of administration entrusted to them 'through corresponding ministries of the Union republics...' (article 78 of the constitution).

   In the field of education, there are only two ministries of this type: the Ministry of 'Higher and Secondary Specialized Education' and the Ministry of Education of the USSR, created in 1966. The Ministry of Culture is also 'Union-republican'.

Further, there are 'state committees' under the Council of Ministers of the USSR, which also perform a function of co-ordination in a specific field. The organization and development of vocational and technical education are co-ordinated by one of these state committees under the Soviet Council of Ministers.

2. Powers of the Union republics

According to article 15 of the 1936 constitution, 'each Union republic exercises state authority independently'; this independent sovereignty of the republics is limited only by the powers conferred on the Union by virtue of article 14, as has been mentioned.

The powers of the republics[1] are therefore exercised in a rather large number of matters.

Organization of the educational system through laws or decrees, in all fields not covered by all-Union laws and decrees. We shall see later how the balance of powers is specifically organized between the Union and the republics, for the various levels of education.

The administration of educational institutions. This is an extremely important prerogative of the republics since, as has been said, the all-Union ministries have a very limited administrative function.

As a general rule, the day-to-day administration of vocational and technical educational institutions, of institutions of higher education and secondary specialized schools ('technicums') comes under the ministries or state committees of the republics. The budget of the republics included, in 1962, about 32 per cent of public funds for education.

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[1] The autonomous republics themselves enjoy certain powers in the organization of education under their own constitutions.

3. Powers of other governmental bodies

The constitution provides that the soviets of workers' deputies, the local organs of state authority, 'direct the work of the organs of administration... direct local economic and cultural affairs...determine and approve local budgets' (article 97).

Within the framework of the laws and decrees promulgated by the Union and the republics, the local bodies perform a supervisory and administrative function which concerns essentially pre-school institutions and primary and secondary schools of general education: the importance of their function is evidenced by the fact that 64 per cent of state funds for education in 1964 were carried on the budgets of these local bodies.[1]

In conclusion, on the basis of the constitution, the Soviet educational system appears relatively centralized with respect to the power of general organization and the allocation of financial resources and, on the contrary, considerably decentralized with respect to the supervision and daily administration of the schools.

B. ROLE OF THE COMMUNIST PARTY OF THE SOVIET UNION (CPSU) IN EDUCATIONAL DEVELOPMENT POLICY

The reference to the provisions on education in the Soviet constitution and the more detailed analysis of the division of powers at the various levels of the government administration, which will be given below, sheds light on a factor basic in this field as in others, namely, the role of the Soviet Communist Party.

We shall outline it briefly now, in its various aspects, so as not to have to revert to it later.

Although the constitution is silent in this respect, the CPSU by itself plays, alongside the constitutional authorities, a decisive role in all the major aspects of the development of the life of the peoples of the Soviet Union; according to its own rules, it is 'the force which directs and guides Soviet society'.

The CPSU is active at all levels, from the formulation of general policy down to certain aspects of day-to-day administration.

1. The CPSU and the formulation of general policy in the field of education

Generally speaking, one may say that all important directives concerning the development of the educational system originate from decisions and resolutions taken at the congresses of the Communist Party of the Soviet Union or the plenums of its Central Committee.

With respect to CPSU congresses, directives of education were most often adopted in the past during the discussion of the targets of the five-year plans, for example:

The sixteenth congress of the CPSU (June-July 1930) lays down as priority target of the first plan the establishment of universal compulsory primary education and the complete elimination of illiteracy.

The nineteenth congress (October 1952) adopts the first resolutions for compulsory secondary schooling and 'polytechnization'.

The directives of the twentieth congress of the CPSU (January-February 1956) for the execution of the sixth plan embody a whole set of measures dealing with the development of the educational system: (a) achievement of secondary schooling (ten-year school) for all, in cities and rural areas; (b) organization of polytechnical education; (c) establishment of boarding schools; (d) development of pre-school education.

The programme of the CPSU concerning the targets for the construction of a communist society, considered by the twenty-second congress in 1961, is designed to speed up the further development and improvement of the educational system at all levels and sets 1970 approximately as the date for the achievement of compulsory general secondary education.

As for the important law mentioned below 'on strengthening the ties between school and life and the further development of the public education system in the USSR', to which we shall often have occasion to refer, it was discussed successively by the appropriate authorities of the Party, of the workers' organizations and of the State: thorough discussion within the competent bodies of the Central Committee of the Soviet Communist Party; discussion in meetings of educational and scientific specialists; discussion by agencies of the State, the all-Union republics, regions, cities and towns, and districts; publication in Pravda of the Central Committee's 'theses' in November 1958 in order to submit them for public discussion; adoption of the new measures on 24 December 1958 by the Supreme Soviet.

In view of the complexity of the problems of education and the magnitude of their financial implications, the directives of the CPSU cannot be formulated without careful previous study. The question arises as to what means are available to the CPSU to prepare the directives of its Central Committee or congress in this field. This question was raised on several occasions by the IIEP mission.

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[1] Including the budget of the autonomous republics.

According to the replies received, a number of procedures are adopted:

1. The Central Committee of the CPSU, like that of each of the republics, has a department specializing in school, university and scientific matters.

   The mission did not obtain any special information on the organization, scope of action or the precise part played by these bodies in the formulation of education policy.
2. Many high officials in educational administration (ministers, deputy ministers, heads of departments) and persons prominent in education, the sciences, etc., contribute directly to the work of the Central Committee's organization in their capacity as members of the CPSU; for this reason, a permanent link exists between the work of the administration and that of the Party.
3. In any event, all the staff and study resources of the administration are available to the Central Committee for the preparation of its resolutions; in particular, as directives on education are usually included in the five-year plans which are submitted for the approval of the congress of the CPSU, they are previously studied and translated into figures by the Gosplan along with the other measures provided in the five-year plan.

Of course, the all-Union ministries, as well as those of the republics, take an active part in the preparation of all important decisions; for example, when the question arose in 1964 of changing certain aspects of the 1958 reform and, in particular, of going back to the ten-year secondary school, all the republics were consulted again and the three Baltic republics were able to request and obtain the maintenance of the eleven-year school.[1]

Likewise, the IIEP mission was informed that the part of the 'CPSU programme' of 1961 dealing with education, particularly the introduction of compulsory secondary education as from 1970, had been the subject of long preliminary financial studies by the Gosplan in order to ascertain that it was in keeping with economic possibilities.

2. The Communist Party and the problems of administering education

The action of the CPSU in education policy making does not occur solely at the level of formulation of general policy and plans. At all levels of the school and university administration, relations are established between the official authorities and the national, regional or local bodies of the Party.

For example, at the level of the ministries of education or state committees of the republics, a member of the education department of the Central Committee can attend the meetings of the 'Collegium' of the ministries[2] as an observer and thus follow directly the development of problems within the administration itself; conversely, the ministers consult the competent member(s) of the Central Committee before taking certain decisions.

At the level of regional or local territorial units, the Party committees play a similar role with respect to the school administrations; they are obviously concerned with increasingly specific and individual problems; however, according to the rules of the CPSU itself, Party organizations must not substitute themselves for Soviet organizations and must ensure 'the separation of powers between Party bodies and other organs' and 'the elimination of unnecessary duplication in work'.

Moreover, the CPSU is active within educational institutions themselves, both with the administrators and the faculty as well as with the students, through Party organizations formed in the larger institutions, trade unions of educational workers ('profsoyuz'), and youth organizations ('komsomol' and the pioneers). We shall not dwell on this point.

To sum up, when one analyses the various levels of jurisdiction and decision-making in educational planning in the USSR, one must bear in mind that, alongside the hierarchy of the constitutional organs of the Soviet State, with whom the power of decision rests under the constitution, there exists the parallel organization of the CPSU, whose role is decisive in many respects.

In fact, given the interest which the Communist Party takes in problems of education, this situation, far from constituting an obstacle to or a check on the development of the school and university system, seems on the contrary to have been an extremely positive factor in meeting the requirements of education in the successive economic development plans of the USSR.

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[1] In these republics, complete secondary schooling had been on an eleven-year basis since before 1958.

[2] The 'Collegium' brings together the minister, vice-ministers and the heads of the main departments.

Section II VARIOUS LEVELS OF JURISDICTION IN THE ORGANIZATION OF EDUCATION AND THE ADMINISTRATION OF EDUCATIONAL INSTITUTIONS

The USSR is one of the few countries of the world where the organization and administration of the various categories of educational institutions are entrusted to three separate administrations.

1. Pre-school education and primary and secondary general education come under the ministries of education of the Union republics; however, the activity of these ministries is exercised - as will be brought out more fully later on - within the framework of the common policy of the Soviet Union as a whole, which takes into consideration both the national interests and the special interests of the republics. Co-ordination of these activities has been effected since 1966 by the new 'Union-republican' ministry: the Ministry of Education of the Soviet Union.
2. Vocational and technical education comes under both a state committee of the Council of Ministers of the USSR and the corresponding administration of the republics.
3. The organization and administration of higher and secondary specialized education are entrusted to a 'Union-republican' ministry and to the corresponding ministries or committees established in the republics.

From the point of view of the division of powers, each of the three main branches of education thus has its own characteristics and, for this reason, should be considered separately.

A. SCHOOLS OF GENERAL EDUCATION

1. Objectives and organization

The definition of the objectives and the general organization of these schools belong to the Union. In accordance with the provision of article 14 of the constitution, the jurisdiction of the Union is limited, within the field of general education, to the definition of the 'basic principles'. These are now determined by the law of 24 December 1958 and certain earlier or later legislation.

The law of 24 December 1958 contains many articles intended to serve as directives and, in the last analysis, a small number of provisions having real force of law, namely, essentially the following:

The law of compulsory school attendance. Extension from seven to eight years of the duration of the compulsory incomplete secondary school.

The length of complete secondary school attendance. Three years are set as the duration of the polytechnical secondary school of general education and labour and of the schools for working and rural youth; this duration was reduced from three to two years for the secondary schools in August 1964[1].

General direction of the curriculum for the eight-year school and the ten-year school. Development of 'polytechnization', of vocational training, etc.

As for all the practical measures implementing the curriculum (time-tables, syllabi, methods), school vacations, etc., they were explicitly assigned in principle, by virtue of articles 8 and 9 of the law of 24 December 1958, to the jurisdiction of the Council of Ministers or of the Supreme Soviet of each of the Union republics.

2. Co-ordination in contents of courses

The need for co-ordination in establishing daily schedules, curricula, etc. Co-ordination of the contents of the courses taught in the general school system is both a quasi-legal and a practical necessity. As will be seen later, the rules for admission to institutions of higher education are laid down by the Union and are the same for the whole of the USSR. For this reason, the secondary schools of all the republics must organize their instruction in such a way as to comply with the common all-Union requirements governing entrance examinations to the universities. As a matter of fact, the requirement that all citizens shall have a common cultural background is a result of the intensive economic and manpower exchange among the various republics. These all-Union requirements have led the republics to adopt practically the same syllabi, at least for the basic subjects.

Certain disciplines such as mathematics and natural sciences are not affected by national differences and can be taught everywhere with almost identical schedules and syllabi.[2] On the contrary, the curricula for history, geography, language and literature are in part peculiar to each republic.

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[1] However, an August 1965 decree of the Praesidium of the Supreme Soviet of the USSR, later ratified by the Supreme Soviet, kept eleven years as the total duration of secondary studies for the Latvian, Lithuanian and Estonian SSR.

[2] This similarity of content of the courses enables the republics to pool their efforts for the publication of textbooks in some subjects.

Co-ordination procedure. Up to 1966, this essential co-ordination was ensured, in part, by the work and the recommendations of the Academy of Pedagogical Sciences (established in Moscow in 1943 by the RSFSR). These recommendations were being used by all republics[1], with allowances made for national characteristics. Another helpful source was in the form of occasional meetings[2] held in Moscow and attended by the republic ministers of education who discussed their major problems.

In August 1966, the co-ordination procedure was strengthened by the creation of the Union-republican ministry of education of the USSR (Supreme Soviet Decree of 3 August 1966) and the conversion of the Russian Academy of Pedagogical Sciences into a USSR academy.

As of that date, the Minister of Education of the USSR was vested with general authority over everything concerning pre-school or kindergarten instruction, general primary and secondary schooling, teacher-training schools, and the development of pedagogical research. His authority is exercised through the ministries of education of the republics.

The Minister of Education of the USSR has the prerogative of approving study programmes and curricula, plans and syllabi, textbooks, etc., based on the suggestions made by the Academy of Pedagogical Sciences. In practice, he delegates some of his powers to the education ministries of the republics, especially for matters in which local peculiarities may need to be taken into consideration. He also issues directives relating to administrative and financing procedures for the schools.

The following now depend directly on the ministry of education of the USSR: (a) the Academy of Pedagogical Sciences of the USSR, which is still the basic agency for the preparation of course plans and curricula; (b) the Council of Ministers of Education of the republics, which has now become the body permanently responsible for the consideration of all problems involved in the development of the general school system and for the adaptation of the general directives to local features of the respective areas.

3. Decentralization of the administration and supervision of schools of general education

The administration and supervision of primary and secondary schools are mainly the responsibility of the regions ('oblast')[3] or special territorial units on the same level[4] and of the districts ('raions'); moreover, every school enjoys a certain degree of administrative autonomy.

Regional administration of education. The regional department of education has many responsibilities: (a) the direct administration, through its own budget, of certain types of institution (primary teacher-training schools, institutes for further education of teachers, young technicians' stations); (b) the supervision of the school administration of districts through its inspectors; (c) the preparation of annual budgets and long-term plans (the region is an intermediate link for this work between the districts and the ministries of education of the republics); (d) the distribution of teaching personnel - in particular the assignment of new teachers among the districts, the appointment of school principals, etc.; (e) the direct financing of school construction (except for schools built by factories or collective farms), etc.

District school administration. The schools situated in a 'raion' are placed under the authority of the director of education of the district; he is assisted by inspectors responsible for the administrative and educational supervision of the schools and by 'methods specialists' responsible for popularizing new teaching methods.

The financing of school expenditures is provided through the district finance office.[5]

It is the district which assigns teachers to schools and transfers them within the district; transfers from district to district are carried out by the region or by the minister of education.[6]

The director of education of the district calls a meeting each month of the 'district council' made up of the most experienced teachers; this council considers all problems affecting the work of the schools, the experiments under way, etc.

School administration (school 'micro-districts'). Each school has its own budget which is established for the whole year by the administration of the district on the basis of over-all estimates (see chapter 4) and which is financed by the budget of

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1. Some of the republics have their own institute for pedagogical research.
2. One or two meetings each year.
3. The cities of Moscow and Leningrad do not come under the administration of a region inasmuch as they have the status of a 'region' and, like the regions themselves, come directly under the administration of the Ministry of Education of the RSFSR.
4. There are 123 regions or 'territories' and ten autonomous regions in the USSR.
5. In the district of Kuba (Azerbaidjan) visited by the mission, 65 per cent of the budget expenditures of the district are assigned to education and 35 per cent to other cultural expenditure and sanitary measures; in the districts of the city of Moscow, educational expenditures represent only 30 per cent of the local budget, because of the greater proportion of other expenditure.
6. True of the small republics where there is no regional administration.

the district. The school budget includes all expenditures (staff, equipment, overheads, etc.)[1]; it is directly administered by the school principal[2], assisted by a book-keeper.

Personnel administration by the school itself is made easier by the highly simplified salary system for teachers: they are paid on the basis of their degrees and seniority, without regard to any promotion based on how the teachers are graded.[3]

B. VOCATIONAL AND TECHNICAL SCHOOLS, SECONDARY SPECIALIZED SCHOOLS AND INSTITUTIONS OF HIGHER LEARNING

1. Centralization of the organization of education

The urban and rural vocational and technical schools on the one hand and the institutions of specialized secondary and higher education on the other are responsible respectively for the training of skilled labour and specialists for all branches of the Soviet economy.

As the Union republics constitute a single economic unit, subject to centralized planning, it was essential that planning for the development of schools and institutions training manpower should belong, in the last analysis, to the jurisdiction of all-Union authorities and that, in all the republics, this training should be organized according to the same standards.

With respect to the definition of curriculum content, the jurisdiction of the Union, as we have seen, is only implied by article 14, t of the constitution, but it is explicitly affirmed by the law adopted on 24 December 1958 by the Supreme Soviet of the USSR.

Chapters II, III and IV of this law lay down respectively the bases for the general organization of these various schools and institutions and articles 19, 26 and 40 empower the Council of Ministers of the USSR to 'ratify' the measures of implementation.

Two separate administrations are responsible for carrying out the tasks of the Union in these fields: the State Committee of the Council of Ministers of the USSR on Vocational and Technical Education[4] and the Union-republican Ministry of Higher and Secondary Specialized Education.

Role of the State Committee of the Council of Ministers of the USSR on Vocational and Technical Education. This state committee provides for the administrative and educational direction of the vocational and technical schools in all its aspects: establishment of rules for the recruitment of students; determination of the content of the various curricula and of the length of the course of studies; preparation of textbooks, production of films, etc.; supervision of the study process through its own research institute; study and dissemination of outstanding education experience; formulation of model plans for schools, etc.

With respect to curricula, the jurisdiction of the state committee covers even vocational training given in factories; however, each republic has the possibility of adapting curricula to local requirements.

Role of the Ministry of Higher and Secondary Specialized Education. The role of this ministry is in many respects similar to that of the state committee analysed above:

1. Establishment of admission conditions of students to all institutions of higher and secondary specialized education of the USSR. It is in this way that the Union authorities exercise a direct influence on the level of general secondary education.
2. Preparation and approval of training plans for specialists for all universities and secondary specialized schools, regardless of the administrative dependency of these schools.

   As a rule, for the whole of the USSR, the curricula are identical for the same speciality; however, in each study schedule a part of the time-table (about 15 per cent) is set aside to permit adaptations corresponding to local requirements.

   For certain types of schools, the curricula are prepared jointly with other all-Union ministries concerned (the Ministry of Agriculture, for example).
3. Establishment of methods of recruitment of the teaching staff.
4. Preparation of the list of specialities taught in institutions of higher education and technicums.
5. Methodological directives concerning the organization of instruction. (This is the role of the specialized committees set up for each scientific branch, which include specialists from all the republics.)
6. Supervision of the organization of instruction leading to scientific research (preparation for the degrees of 'kandidatura' and 'doctorate') through its 'Higher Certifying Committee'.
7. Publication of a large part of the textbooks used in higher education.

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[1] The budget of every school includes funds 'to encourage school attendance', intended to cover certain expenses (clothing, books, etc.) for needy children.

[2] At least in city schools; for small rural schools, the districts meet the expenditures directly.

[3] The inspectors advise teachers but do not grade them.

[4] The state committees replaced the Main Administration of State Labour Reserves established in 1940.

8. Study of plans for building construction for universities and institutions of equivalent level through a specialized agency under the ministry, known as the Giprovuz.

2. Decentralization of the administration and supervision of educational institutions at the level of the republics and the regions

In each republic, authorities (ministries[1], committees, etc.) have been set up which are responsible respectively for the administration of institutions for vocational and technical education, and for higher and secondary specialized education.

Most institutions of higher education[2] and most technicums are administratively subordinate to the committees or ministries of the republics and are financed from their budgets. Some technicums (teacher-training technicums, for example) are, as a rule, administratively subordinate to the regions.

This means that ministries or committees of the republics are directly responsible for problems relating to the provision of material facilities and for administering and inspecting the staff[3] of all the institutions under their jurisdiction.

The committees on vocational and technical education have identical responsibilities with respect to their own schools.

Each school has its own budget financed by the budget of the corresponding ministry committee (or by that of the region).

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[1] The larger republics have established a ministry of higher and secondary specialized education.

[2] Some institutions of higher education are administratively subordinate to all-Union ministries (ministry of agriculture, public health, transport, etc.).

[3] Institutions of higher education recruit their staff members themselves.

Section III DECISION-MAKING CENTRES IN EDUCATIONAL PLANNING

The factors which must be taken into account in determining targets of educational development plans in the USSR are, as in any other country, highly varied: political, economic, financial, educational, demographic, etc. All these factors are indeed closely related: political authorities, when they take their decisions, cannot overlook the educational, economic or financial factors. For this reason, if, as has been said, primary responsibility for important decisions belongs to the highest bodies of the Soviet State or to the organs of the CPSU themselves, an important part is nevertheless played by the technical administrative bodies responsible for preparing decisions and carrying them out.

A. PROGRAMME OF THE CPSU AND THE DETERMINATION OF LONG-TERM EDUCATIONAL DEVELOPMENT TARGETS

The programme of the CPSU concerning the building of communism adopted in October 1961 during the twenty-second congress contains the long-term targets (1980) for economic and social development. In the field of education, the CPSU programme sets the essential targets for development to be implemented by all kinds of institutions: introduction of universal complete secondary schooling and raising of the level of education; development of institutions of social education (nurseries, kindergartens, boarding-schools, etc.); extensive development of higher and secondary specialized educational training in order to meet the requirements arising from the economic expansion anticipated by 1980.

The programme of the CPSU, on the provisions of which we shall not dwell any further, constitutes a 'master plan' which gradually finds concrete expression in the long-term plans (the 1959-65 seven-year plan, the 1966-70 five-year plan) and in the successive annual plans.

As has already been said it is the congress of the CPSU which has the task of adopting the target directives of the five- or seven-year plans, including targets for education; for example, the twenty-third congress of March 1966 discussed and adopted directives for the eighth plan of economic expansion (1966-70). On the other hand, economic plans and annual budgets are approved by the Supreme Soviet of the USSR.

In fact, as we pointed out when considering the role of CPSU, the determination of long-term targets is not carried out independently of the government administration but, on the contrary, in close contact with it.

B. PREPARATION OF LONG-TERM EDUCATIONAL DEVELOPMENT PLANS[1]

We have seen that in the USSR three separate administrations exercise jurisdiction respectively over general education, vocational and technical education, and higher and secondary specialized education.

Each of these administrations has its own part to play in the procedure of preparing long-term educational development plans, but the chief co-ordinating agencies in the preparation of the draft plans are the Gosplan of the USSR and the Gosplans of the republics.[2]

Within the framework of the Gosplan of the USSR, various departments - and two of them in particular - have a voice in the field of educational planning: (a) the department of culture and education has jurisdiction in the preparation of the overall plans for the development of general education, secondary specialized education, and higher education: (b) the manpower department is responsible for working out the general plans for the development of vocational and technical education.

Planning projects are channelled to these two departments, in their respective specialities, affecting the Soviet Union as a whole, by the Ministry of Education of the USSR, the Ministry of Higher and Secondary Specialized Education of the USSR and the State Committee of the Council of Ministers of the USSR for Vocational and Technical Education.

The introduction to Part Two of the Soviet authors' study explains how the planning of all the branches of the economy, including education, is carried out according to the principles of 'democratic centralism'. Proposals are prepared at the bottom, by enterprises and administrations; they are collected and examined by the Ministries and the Gosplans of the republics and are then transmitted to the Gosplan of the USSR. On the basis of these proposals the latter body sets the targets to be achieved for the whole of the Union. When the general targets of the plan have been determined by the Union authorities, the plan 'returns downward' to the all-Union ministries, republics, regions, districts, enterprises, educational institutions, etc. and assumes concrete shape in the form of more and more specific targets of a compulsory nature.

In fact, the preparation of the five-year plans does really include many-sided consultation - according to the sectors of activity - of organs at the bottom; however, it is not only in the middle of this procedure that the ministries and the Gosplan of the USSR are active: in many respects, the preliminary work of synthesis effected by them is of great importance for the successive formulation of the plan. The procedure for the formulation of the 1966-70 five-year plan with respect to educational institutions is analysed below.

1. Preliminary work of the USSR Gosplan

The formulation of the eighth plan (1966-70) began during the first quarter of 1964 with a set of extremely complex preliminary studies conducted by all departments of the Gosplan - particularly involving the department of the national economic plan - the object being to set forth the different options possible for the eighth plan in the form of preparatory outlines, or draft plans.

Each draft plan includes assumptions, expressed in figures, on: (a) the determination of an overall growth rate; (b) the use of the national product (consumption and investment); (c) the distribution of investments by branch of activity.[3]

The consistency of each draft plan is checked year by year[4] through the preparation of a series of 'balances' established globally for the USSR: balance of 'inter-sectorial' exchanges;[5] balance of manpower; financial balances, particularly those concerned with income and expenditure carried on the state budget.

Each of the draft plans includes the assumptions for the development of the educational system which appear most appropriate at this stage and which, in all events, are based on the targets defined by the CPSU programme. It is understood that these assumptions are only of a preliminary nature and that they are subject to amendment in the light of the results brought out in the consultative procedure which has been described, in order to reach final decisions on the content of the plan.

The draft plans are submitted for discussion to the Collegium of the Gosplan and then to the government. They enable the planning agencies to envisage the major options affecting the economic development of the Soviet Union, and at this stage the more appropriate options are beginning to reveal themselves.

This preliminary work sets in motion the process of establishing the plan. The time-table of the procedure and of the surveys[1] is determined by the Soviet Gosplan in consultation with the all-Union ministries concerned.

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[1] Generally a five-year period.

[2] In the introduction to Part Two of the Soviet authors' study, a general presentation of the organization of the USSR is given.

[3] One hundred and twenty branches are dealt with.

[4] With more accuracy for the final year of 1970.

[5] The balances are established as a result of the work of the Economic Research Institute of the Gosplan and certain other specialized institutes.

2. Formulation of draft plans for general education

At this stage, in each of the republics of the Union, the planning and finance department of the ministry of education becomes the centre for the preparation of the draft plan for the development of primary and secondary general education.

Surveys in the regions and districts. Towards the end of 1964, instructions and questionnaires were sent by the ministries of education to the education departments of the regions and districts.

The questionnaires contain the essential 'indicators' which must appear in the draft plans at each level of educational administration. (See chapter 2 of Part Two of the Soviet authors' study.)

The instructions do not set too rigid and detailed targets, but only indicate general targets (eight-year schools, ten-year schools, etc.). The district and regional administrations thus enjoy a certain degree of initiative in drawing up their replies to the questionnaires.

The draft plans of the districts are prepared taking account of the general targets to be achieved as well as of the special situation of the district (birth-rate, population transfer, current holdovers, places available, etc.) and are sent to the regions; the regional administrations check the requirements of the districts on the basis of their own information and recapitulate them; to these they add their own requirements and send the whole to the ministry of education (beginning of 1965), to the Gosplan and to the ministry of finance of the republic.

The draft plans of the ministries of education and their discussion in the Gosplans of the republics. The planning department of the ministry of education then prepares a draft plan for the whole of the republic. It does not purely and simply add up the requests received but subjects them to a detailed critical appraisal. Taking account of the statistical information in its possession and the information - not available on the spot - on the future development of certain regions, it introduces corrections in the regions' plans.

These corrections often call for discussions with the local authorities; these discussions bear mainly on the number of classes to be set up[2] and the number of first-year pupils to be admitted, data which are the basis of all subsequent financial calculations.

The planning department's draft is submitted to the collegium of the ministry and then sent to the Gosplan of the republic which, as has been stated, has been informed directly of the regions' requests.

A new discussion opens at this stage and, if necessary, new corrections are introduced. Finally, the draft plan is adopted by the council of ministers of the republic and sent to the Gosplan of the USSR (May 1965) and, as of 1967, to the Ministry of Education of the USSR.

Annex IV of the Soviet authors' study shows in what form a republic's plan is presented with respect to numbers of pupils and classes; this draft plan also includes estimates of the number of teachers to be trained[3] and of expenditure for the construction and operation of schools. The estimate of expenditure is made with the assistance of standard provisions worked out by the Gosplan and the Ministry of Finance of the USSR. (See chapter 4 of this report.)

Review by the department of culture and education of the USSR Gosplan. At this stage, the department has under consideration all the draft plans concerning general education which have been referred to it by the councils of ministers of the republics, and by the USSR Ministry of Transport for schools connected with it.[4]

It then studies the drafts in conjunction with the republics and, as of 1967, with the USSR Ministry of Education, etc. and works out a comprehensive educational development plan which is submitted to the national economic plan department - and to the top authorities - of the USSR Gosplan.

3. Formulation of draft plans for the training of skilled manpower and of specialists

The requirements for skilled manpower (vocational and technical schools) and for specialists (secondary specialized schools and institutions of higher education) are determined following the methods set forth and commented upon respectively in the study of the Soviet authors (chapters 3 and 4 of Part Two) and in chapter 3 of this report;

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[1] Some of the questionnaires used for the surveys are annexed to the Soviet authors' study.

[2] The crucial problem remains, in most rural districts, the elimination of classes with small numbers of pupils.

[3] Because of the time required for training, this estimate has been made up to 1975.

[4] As of 1967, the councils of ministers of the republics forward their annual draft plans to the USSR Ministry of Education, which uses them as the basis for its proposed plan for the development of schools for general education throughout the Soviet Union for consideration by the USSR Gosplan. This procedure will also be followed henceforward for the draft five-year plans.

we shall not take up these problems here except to emphasize that the responsibility for the working out of these methods is shared between the USSR Gosplan, on the one hand, and the Ministry of Higher and Secondary Specialized Education and the USSR Council of Ministers' State Committee for Vocational and Technical Education, on the other hand, each for its own field.

With regard to the formulation of plans for training, although the procedures are not similar for skilled manpower and specialists, we can, roughly speaking, distinguish two main stages:

The formulation of draft training plans for skilled workers and specialists by agencies of the republics. For all enterprises or administrations which come under the council of ministers of a republic, the estimation of requirements is carried out under the direction of the Gosplan of the republic; the Gosplan: (a) sends to the enterprises, 'sovnarkhozes'[1] and administrations concerned forms to be completed relating to the forecast of their requirements (see annexes VII, VIII, XII, XV, and XVI); (b) draws up, on the basis of the information received, a draft plan for the preparation of skilled manpower (annex IX) and of specialists (annexes XIX and XX).

At this stage, the ministry (or the committee) for higher and secondary specialized education and the committee for vocational and technical education contribute only methodological assistance in the evaluation of the requirements. They are kept informed of the results and participate in discussions on the conclusions to be drawn therefrom with regard to the development of the educational institutions to be included in the plan.

Lastly, a draft training plan is submitted to the council of ministers of the republic and sent to the USSR Gosplan.

The all-Union ministries which are directly responsible for certain sectors of the economy[2], however, carry out their surveys themselves and send their draft plan directly to the USSR Gosplan; these draft plans are drawn up by republic.

The task of synthesizing in the USSR Gosplan's department of culture and education and department of manpower. The USSR Gosplan (departments of culture and education and of manpower) thus has before it proposals concerning all of the republics and all of the sectors of national activity. It is then faced with a twofold task: (a) to carry out, in co-operation with the Ministry of Higher and Secondary Specialized Education,[3] on the one hand, and the Council of Ministers' State Committee for Vocational and Technical Education, on the other, a critical appraisal of these proposals and their co-ordination;[4] this work calls for numerous exchanges of views with the authors of the draft plans; it leads to an adjustment, upwards or downwards, of the requirements as expressed; (b) to translate the requirements into specific training plans; these plans are divided by republic, year by year, by groups of speciality[5], and by type of instruction (day, evening or correspondence).

4. Final stage of formulation of the draft plan by the USSR Gosplan

The department of the national economic plan of the USSR Gosplan finally receives from the department of education the projects for the three main branches of the educational system.

These projects contain, essentially, the indices of annual enrolment trends and the total capital expenditure required during the period covered by the plan; the estimate of the corresponding operating expenses is worked out jointly with the Ministry of Finance, following the cost standards adopted.

Thus, at this level, there takes place a final confrontation of requirements, desirable targets and means of financing: the financial experts endeavour, no doubt, to discover new resources for education, but, conversely, adjustments can be made in the draft plans after examination of priority requirements. We shall come back to this problem of the choice of priorities as governed by the imperative of financing.

Finally, and in the light of the studies concerning all the sectors of the national economy which took place in 1965, the economic, financial and manpower balances drawn up originally by the department of the national economic plan are given definite form. In any event, these final adjustments must respect the consistency of the plan, in all its aspects.

Thus the Gosplan drew up, at the end of 1965 and at the beginning of 1966, the summary report which was successively submitted to the Council of Ministers of the USSR and then, in March 1966, to the twenty-third congress of the CPSU.

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1. Before the reform of October 1965.
2. Some all-Union ministries, as has been pointed out, also administer training institutions directly.
3. And, as of 1967, as mentioned previously, with the USSR Ministry of Education.
4. For specialities taught only in certain republics account must be taken of the requirements of the whole of the USSR, which are not always known at the republic level.
5. Subsequent annual plans state the specialities.

5. Contents of the five-year plan with respect to education and the 'return downwards' of the plan

Only the general summary report submitted to the congress of the CPSU and the resolutions of the congress are published by the Soviet authorities; these documents contain, with respect to education, only the basic indices (number of pupils in schools of all kinds, targets for the training of skilled manpower and of specialists during the period covered by the plan, etc.)

The USSR Gosplan finally possesses, however, extremely detailed documents[1] laying down, for each republic and for each type of education, as well as for each year, the trend of admissions and of total numbers enrolled in school, and the trend of expenditure (investments and operation).

These data form an integral part of the manpower and financial balances.

After the decisions of the Union authorities, the five-year plan moves in the opposite direction; the approved targets are respectively or successively communicated to the all-Union ministries, to the republican ministries, to the regions and districts and are definitively adopted on this level. It should be emphasized that when the republics have additional local resources available they may increase certain targets.

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[1] See the model plans annexed to the Soviet authors' study.

Chapter 2

Development of the polytechnical school of general education

INTRODUCTION

From the very first years following the Revolution the Soviet authorities undertook continuing efforts with a view to developing education and raising its level. The main landmarks achieved by these efforts include the eradication of illiteracy, the four years of compulsory schooling established in 1930 and seven years in 1949. As these tasks were accomplished, new goals appeared: prolongation of compulsory schooling, to eight years in 1958, development of the secondary school system, etc. In this way the foundation was laid for the next task, namely, generalization of complete secondary education for all youth.

This measure was included in the programme adopted by the twenty-second congress of the Communist Party in October 1961 as the main target of education policy. The implementation of this measure will place the USSR in the vanguard of general education at this level. The experience acquired by the USSR in the eradication of illiteracy and the introduction of compulsory primary education is of great value for the developing countries; likewise, Soviet experience in the introduction of universal secondary education is particularly valuable for countries which are coping with the same problems.

What are the special features which characterize the introduction of universal secondary education in the USSR? To answer this question, we must first make some observations on terminology. In the historical development of education in the USSR one speaks first of the four-year primary school and then of the seven-year school which constitutes the next stage in the extension of compulsory education; it is no longer called the primary or basic school, but the 'incomplete' secondary school. Then comes the establishment of the ten-year schools, called 'complete' secondary schools.

In the terminology of many Western countries the secondary school is an institution which educates only a certain percentage of children above a given age. All young children attend the elementary primary grades together, but, later on, alongside the secondary grades open to some of the children, there exists the final primary grades intended for the remaining children of the same age.

On the other hand, Soviet terminology now defines the secondary school as an institution which must be open, in principle, to everyone of the appropriate age between kindergarten and the university. The secondary school is divided into three 'cycles': the first two (grades 1-3 and grades 4-8)[1] constitute the incomplete secondary school; the third cycle (grades 9-10) consists of the higher secondary grades.

The various schools existing in the Soviet Union offer either the first cycle alone (primary school), or the first two cycles (eight-year schooling) or the three cycles (complete ten-year schooling).

The characteristic feature of this system is the homogeneity of its first two cycles. These now include, during a total period of eight years, a unified programme for all children from 7 to 15 years of age. This approach to education is distinguished from that followed in Western European schools, where curriculum differentiation begins much earlier. In the Soviet school system, all youth thus receives the same education up to the age of 15.

Some will find that this period of uniform education lasts too long and leads to drop-outs because of the fact that the most capable children are held up in their development by the need to study at the same pace as those who are less gifted. On the contrary, it may be maintained that, in the course of the development of the child's personality, the differentiation and promotion of individual aptitudes are not essential before the age of 15 or 16 and do not require the diversification of education; it may even be claimed that education in common, in schools with identical curricula, creates the basic language, shared by all citizens, which must exist in a democracy.

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[1] This new combination of the first two cycles results from the decision of the Central Committee of the USSR Communist Party and the USSR Council of Ministers on measures intended to improve the efficiency of the secondary schools.

However, while applying the principle of a uniform programme for all pupils in the eight years of compulsory schooling (grades 1 to 8, inclusive), the interests and aptitudes of each pupil are taken into consideration and a great deal of attention is given to their individual development by means of additional exercises in class and in homework, by participation in study clubs organized by the school in fields of science and practical activities, or by taking part in activities of other institutions, such as cultural centres, pioneer palaces, activity and instruction clubs for young technicians, and young farmers, etc.

Grade 8 marks an important stage in the educational system because after this grade part of the young people leave the full-time schools of general education for vocational or secondary specialized schools (technicum), or else go directly to work. However, from the point of view of curriculum, grade 8 does not constitute the real conclusion of a cycle. Complete secondary education can be obtained not only by attendance at the full-time secondary schools of general education, but also at evening schools or correspondence schools, or by registration in vocational schools combined with secondary evening studies or in schools of the technicum type. As it is considered that all Soviet youth must receive, sooner or later, complete secondary education through one of the ways mentioned above, grade 8 is only a stage of which grades 9 and 10 are the normal continuation. The new curricula were recently prepared in this spirit. The two final grades are thus the completion of a 'linear' system.

For example, for literature and history the curricula cover a period of three to four years, only half of which has been completed at the end of grade 8. For this reason, the term 'incomplete secondary school' is particularly appropriate to designate an eight-year school which does not constitute a cycle of education complete in itself.

Secondary studies may be completed, as we have said, in grades 9 and 10 of the school of general education or in schools of another type. As the majority of youth (about 70 per cent) is to be found in these grades and as the school of general education is thus the main channel for 'complete' general secondary education, it is these two years which give rise to the most important problems with respect both to the curriculum as well as to the methods of instruction.

What should be the characteristic features of the curriculum for complete secondary education? How many years can it or should it last?

Section I

CURRICULUM CONTENT: PROBLEMS OF SCIENTIFIC EDUCATION, 'POLYTECHNIZATION' AND VOCATIONAL TRAINING

A. THE 1958 REFORM

The solutions proposed today for these problems differ from those of a few years ago. The 1958 reform provided that the curricula of the secondary school of general and polytechnical education would include vocational training. For this purpose, the time-table included a certain number of hours devoted to practical exercises and especially to productive labour. Since only part of the graduates are admitted to institutions of higher education, this reform had been adopted for the purpose of ensuring that the remaining students would be able to take up a vocation directly on concluding their secondary studies. It was also thought desirable from an educational point of view to put youth in touch as early as possible with productive labour and that thus young people would be able to make their plans for the future with full awareness of the situation and not consider admission to institutions of higher education as the only possible solution.

The 1958 reform took place at a time when the number of graduates wanting to pursue university studies had considerably increased and when institutions of higher education could offer only a limited number of places, as strictly defined by the requirements of the national economy. As it was not possible rapidly to increase the number of places available in the universities, and as it was not desired to limit the number of students in the final grades of the secondary schools of general education, a solution was sought by the organization of compulsory vocational education within the secondary school of general education. Moreover, priority for admission to higher education was given to those who had spent two years working in a factory: it was felt that the prospect of these advantages would encourage young people to enter a vocation rather than rush into higher education immediately after the end of their secondary studies. Thus the organization of vocational education within the secondary school of general education and the priority granted candidates for higher education who had been working on an actual job were closely linked with the principles underlying educational policy in 1958.

The law of 24 December 1958 'on strengthening the ties between school and life and the further development of the public education system in the USSR', helped to form closer relationships between the education and training of the pupils and the life and work of the Soviet people. Several secondary schools have been quite successful in the preparation of their students for actual productive activities, but several years of experience have shown that, in general, this reform has not yielded the results expected, mainly for reasons which include the following:

1. Most of the schools did not yet have the necessary materials and qualified teachers so as to give adequate vocational training to the pupils.
2. Too many boys and girls were led, by the mere chance of where they happened to live, into being given the qualifications which corresponded to those of the workers in the nearest factory, but which did not necessarily coincide at all with the needs of the national economy or with their own preferences.
3. In small and medium-size enterprises, the organization of vocational education proved very difficult, etc.

Moreover, it was noted that only a small percentage of the graduates of the polytechnical secondary school made any real use in their working life of the training received. For all these reasons, the reform introduced in 1958 was amended in 1964.

B. THE RETURN TO TEN-YEAR SCHOOLING - THE 1964 REFORM

The changes made in the Soviet educational system in 1964 concerned the forthcoming generalization of complete secondary education and of polytechnical instruction. Practical initiation in productive work was retained in only a limited number of schools having the necessary facilities and conditions for providing that kind of training.

The purpose of the secondary school of polytechnical and general education has not changed: it is still designed to prepare its students either for higher education or for vocational and technical studies and the exercise of a trade. As a result, the curricula of the new ten-year schools had to be prepared taking into account the interests of the different groups of graduates, i.e., those who will go on to higher education and those who will enter a vocational or technical school. How can the curricula of the secondary school be adapted to satisfy these two types of requirements?

1. The scientific curricula

The main feature of the new curricula is to raise the scientific level of the schools by making the problems of modern science comprehensible to the students. The reform is designed to give the same level of knowledge to all students; education today must not only prepare for higher education but also serve as a basis for all practical work. The effort accomplished in this direction is considerable. The previously compulsory curricula have been the subject of penetrating criticism which has shown that their content is far from being in line with modern science, that it is often anachronistic, and that the parts devoted to modern research have been added in a mechanical way to the traditional chapters. Thus the new curricula could not take the form only of a correction of the old; they involved a thoroughgoing transformation. In order to teach all the subjects of the curriculum according to the data and methods of modern science, greater stress was placed on theory and on those facts which illustrate it directly. The subject-matter of courses in which a profusion of detail had overburdened the children's memory, instead of developing their intelligence, has been reduced, and in this way an attempt has been made to develop the teaching process and to awaken the students' intellectual interest.

As a result of the changes made, an improvement in teaching methods and the development of different forms of individual work by the students are required.

New textbooks are also required to help students acquire with more facility the essential ideas and the main theoretical concepts of modern science. We cannot describe here in detail the content of all the curriculum changes and will confine ourselves to indicating their general nature: the new curricula in physics, chemistry and biology have completely changed in appearance. All the achievements of modern science as well as the underlying trends of scientific development constitute the backbone of the curriculum, whereas the traditional materials, mostly descriptive, have been eliminated or greatly reduced. The same is true of the mathematics curriculum: many innovations have been introduced including the elimination, inter alia, of the contradictions between arithmetic and algebra and the development of those branches which have now assumed paramount importance for technology, physics, biology and economics.

2. The polytechnical nature of the curricula

The second basic feature underlying the curriculum reform was the emphasis placed on the polytechnical nature of the curriculum.

Polytechnical education has undergone a long and varied development in the USSR; on the basis of the ideas of Marx, the Russian communists, as early as the first years following the Revolution, attempted to draw up theoretical and practical directives in this field. Already Lenin, in his article on the work of the Commissariat of Education in 1921, emphasized the general and social nature of polytechnical education combined with vocational and technical training.

Educators of this period, such as M. Krayskaya, A. Lunacharskii, and P. Blonskii, have analysed in official documents (for example, the 'Principles of the unified labour school' of October, 1918) the concepts of polytechnical education. The studies and experiments of this period were compared during an important meeting devoted to the problems of polytechnical education which was held in 1930.

In practice, polytechnical education changed its nature rather often. It first took the form of participation by students in the productive labour of industrial or agricultural units or in the laboratories of establishments closest to the school; participation in production was carried out under the direction of instructors during classes in physics or chemistry. One of the symptoms of these difficulties was the abolition of manual education and the elimination from the curriculum of the subject entitled 'handicrafts and labour' (1937).

The war interrupted all the discussions on this subject, and it was only after the war that they were resumed. Vigorous debates were waged by Kalachnikov, Shabalov, Skatkin and Goncharov. Various ideas were put forth and tried out in practice in hundreds of schools. The 1958 school reform emphasized anew that polytechnical education should be organized in such a way as to serve as an essential link between the school and life.

However, it was not easy to organize, within the secondary school of general education, polytechnical education which was supposed, moreover, to provide the students with a definite vocational training. In some schools so much stress was laid on preparation for a trade that polytechnization became a kind of vocational training. In other schools, on the contrary, so much emphasis was placed on the teaching of the sciences that polytechnization became synonymous with laboratory work in physics or chemistry.

The new curricula prepared in 1965 attempt to avoid these dangers. As the secondary school is no longer compelled to provide vocational education, polytechnical education is thus freed of many of the earlier difficulties. It can maintain its heterogeneous nature more easily today. The difficulties which now appear are of another type: they concern the teaching of the scientific disciplines. The new curricula emphasize the convergence, in our time, of the development of science and technology. Because of this convergence, the polytechnical school must be in very close touch with theoretical and scientific teachings; it obviously also has a certain skill in the manipulation of the necessary tools. But manual and practical work cannot be an end in itself; it must be linked to scientific and technological problems.

The new curricula emphasize the scientific basis of polytechnization and introduce a new subject 'Preparation for work'. Two hours weekly are devoted to it in grades 1 to 10. The teaching of this subject is designed to acquaint students with the main trends of the national economy from a scientific and technical point of view, to give them some knowledge of the basic elements, to train them in handling tools, and in collecting an elementary technical documentation. This instruction must be organized in the school, in laboratories and study halls; the participation of the students in the work of adults in industrial or agricultural establishments is not systematically provided for. Provision is made only for organized visits to enterprises and for certain forms of socially useful productive labour in school.

Thus a broad polytechnical education, freed from narrow vocational training, is to become one of the important factors of modern general education. In this age of dynamic development of science and technology, in an age when the livelihood and daily life of men are more and more conditioned by technology, it seems self-evident that general education can no longer confine itself to the traditional forms (humanities, philology or abstract science). It must take account of the scientific and technical progress which is characteristic of modern civilization. The concept of polytechnical education in the USSR outlined in the 1965 curricula is intended to meet these requirements.

The authors of these curricula hope that this type of scientific and polytechnical education will prove useful and adequate both for graduates who are preparing for university studies and for those who, after finishing secondary school or doing additional training, will go to work, as well as for those who would like to continue their studies in evening courses.

3. Is the ten-year cycle long enough?

This question deserves thorough analysis. We all know that, in most countries, the school cycle preceding university studies lasts about twelve to thirteen years. Will the ten-year school cycle be long enough? And does an affirmative reply mean that in other countries two to three years are wasted on unnecessary studies? Or perhaps the contrary is true and a longer cycle is needed? In this case, the ten-year cycle adopted in the USSR would be insufficient.

An answer to these questions would require precise studies on the new curricula and teaching methods which alone would make it possible to determine the actual relative level of knowledge and intelligence of students. In the absence of such studies, however, it is possible to make some observations.

The level of secondary education in the ten-year school, if we judge by the curricula, is especially high in mathematics and the natural sciences. In particular, the level of instruction in mathematics, to which six hours weekly are devoted starting from the elementary grades,[1] is no doubt higher than in the scientific sections of 'lycées' and gymnasia in other countries. The level of knowledge in physics, chemistry and biology does not appear to be lower than that of other countries. Certainly the level of the humanities is lower if one compares it with the classical 'lycées' and gymnasia, but it is not inferior to the instruction given in this field by secondary sections specializing in mathematics or the natural sciences.

How does the ten-year secondary school obtain results close to those obtained elsewhere in twelve or thirteen years? Are greater efforts required from the students?

The number of weekly hours of work is rather high,[2] but it is not appreciably different from the schedule followed in other countries. Time is saved in other ways. These savings are partly fictitious because we must not forget that in most other countries the twelve-year education cycle begins at the age of 6, with the primary school, and even at 5 in some countries, whereas in the USSR the school cycle starts at the age of 7. However, children of 7 who enter primary school have in many cases attended kindergarten, where they have already been given the rudiments of reading, writing and arithmetic, in particular. In the last analysis, the savings of time are effected mainly owing to the elimination from the curriculum of classical languages; however, other countries have eliminated the teaching of these languages in many schools and have nevertheless kept a system having a twelve-year school cycle. All these factors do not thus provide a final solution to the question of the length of the school cycle, but we must note that a definite saving of time has been achieved thanks to which, in spite of the shortening of the total period of studies to ten years, the same level of education as formerly is attained.

A first saving of time is effected in the primary school. After repeated experiments and trials, the decision of 10 November 1966 which we have mentioned provided for the reduction of this cycle, in the near future, from four to three years. This decision was adopted to take into account the more rapid mental development of children between the ages of 7 and 10 under circumstances of modern civilization and in view of the possibility of more intensive teaching with the help of new educational methods. The traditional school treated children in too puerile a fashion and its verbal, direct methods involved a great loss of time. The teaching of mathematics has been the subject of particularly interesting experiments. These have shown, for example, that it is possible to begin the teaching of algebra much sooner than was done formerly and that grade 3 students find intellectual satisfaction in using symbols.

With elementary grades completed after grade 3, at the age of 10, it is then possible to begin education 'of the secondary level' in grade 4.

From this time on, a new series of savings of time is obtained by organizing the curriculum according to a linear progression which eliminates the repetitions of the same subjects peculiar to the 'concentric' system. It is significant that grade 8 does not break off the linear system and does not 'close off' the cycle although some students leave the general school after this grade. Neither the literature, history or natural science courses end in grade 8. The students who leave the school do not complete the subjects; it is assumed that they will complete them later in other circumstances and in other schools.

It is thought moreover, that the largest savings of time will be made possible by better organization of intellectual work in conjunction with the new school curricula.

The new curricula, following the idea of raising the theoretical level of education and linking it directly to the premises of modern science, emphasize important scientific theories and ideas. These 'basic ideas', as they are called, are to serve as a focus for the students' work; the subject-matter of the course will be arranged around them in order to furnish the knowledge essential for a correct interpretation of scientific laws so that the students may understand them and become accustomed to scientific language. The subject-matter of the courses organized around the 'basic ideas' becomes more interesting for the student

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1. On this problem of the comparative time devoted to the various subjects in Soviet and Western European schools, see the work by Raymond Poignant, L'enseignement dans les pays du Marché commun. Paris, Institut pédagogique national, 1965, pages 67 and 319.
2. See section IV.A. hereunder: 'Hobby clubs' and 'optional' subjects.

because it 'means' something; it becomes easier to retain for a longer time than mere isolated facts. The authors of these curricula hope that instruction organized in this way will be more effective and will make it possible to avoid lost time at school.

All the savings of time thus achieved will make it possible to concentrate in a ten-year cycle of education the knowledge considered essential to go on to university studies or skilled practical work. The time saved by these reforms is valuable not only to individuals but also to the country which will be able to reduce social expenditures on the education of youth. Lastly, this measure will facilitate the extension of complete secondary education to all youth.

Section II INTRODUCTION OF UNIVERSAL SECONDARY EDUCATION

The problems of the educational curriculum which we have just set forth are only one of the aspects of the important problem involved in the introduction of universal secondary education; the second aspect of the question is the organization of this type of education. The decision to provide complete secondary education for all youth constitutes a major point in the 1961 CPSU programme. However, the measures by which that decision will be implemented will be provided by decrees of the USSR government and the governments of the republics. The programme could be carried out in quite different ways. In this field, as in that of the content of general education, the experiments and innovations as well as the plans and projects of the Soviet Union are extremely interesting.

A. SECONDARY SCHOOLS

The day-time secondary schools of general education are the principal means used for the introduction of universal secondary education. At present, about 70 per cent of the students go on from grade 8 to grade 9. The evening secondary schools constitute a second way; they offer their instruction to students who, before working in an enterprise, had finished the eight-year school. Moreover, more than 12 per cent of the young people who finish grade 8 go on to vocational schools and among these, the great majority continue with general studies at the same time in evening schools. Lastly, and this constitutes the third way, the secondary specialized schools (technicums) which follow the eight-year school enrol a certain percentage of youth, who receive general education in addition to vocational training.

In principle, these three ways offer equivalent general instruction; however, so far it is the day-time school which provides a complete general education under the best conditions.

The choice between these different ways, and the factors which determine the future of young people after grade 8, constitutes a problem. Why do some students go on directly to grade 9 whereas others follow a way which is much more difficult for their subsequent studies, namely technical and vocational education? Admission to grade 9 is not based on an examination; therefore, all those who want to finish their general secondary education normally could do so. Why do some of these young people pass this up? Would the reason for their decision lie in their own or their families' preference or in objective obstacles which compel them to leave the normal way of general secondary education?

The factors which determine the orientation of young people at this level are quite varied. Sometimes their decision is influenced by material problems: although schooling is free, school attendance does not make it possible to earn money and thus may prove expensive. In other cases geographical factors prevail: the place of residence and its remoteness from the school. Moreover, positive factors may play a decisive part; for example, the advantages offered by a vocational secondary school. In addition to room and board, the school offers other advantages free of charge and may pay a third of a worker's salary for work performed by students in the form of practical activities.

The difficulties involved in attending the general secondary school or the advantages offered by the vocational school are adequate reason for some students to leave the general secondary school after finishing grade 8. It may be noted that the decision to leave school is taken without the assistance of a school counselling and guidance service.

This state of affairs will continue in the near future. Vocational schools can meet only part of the demand for skilled workers for the national economy; it is planned therefore to develop them on a large scale: whereas they now have about 1.5 million students, in 1970 it is expected that they will have 2.8 million. As a result, a rather high proportion of young people (about 20 per cent) will continue to leave the general secondary school for the vocational secondary schools.

Likewise, the enrolment of the technical schools will also increase in order to reach the desired proportion of four technicians to one engineer.

In order to better solve the problem of making secondary education universal, it is planned to raise gradually the level of aptitude for enrolment in the vocational schools by admitting students only after grade 10. This measure also affects the secondary specialized schools (technicums), the majority of whose students are at present recruited after grade 8. For this reason, the increasing numbers of those completing secondary school who are unable to gain admission to higher education will be able to turn to the vocational and secondary specialized schools.

B. ADMISSION TO HIGHER EDUCATION

In a certain sense, this situation presents advantages for higher education: it makes it possible to raise the level of the entrance examination. As a result of the expansion of the terminal cycle of secondary schooling, the number of candidates coming out of that system is increasing each year more rapidly than the number of places open, and, moreover, all the universities state that henceforth they must strive more to improve the quality of studies than to increase the number of students. From the point of view of the national economy, this situation appears advantageous to the extent that enterprises will be able to draw upon better trained specialists. From the point of view of the individual, this situation sometimes produces delicate problems. Those finishing secondary schools often still look upon their diploma only as a key to higher educational institutions, and the necessity, in case of failure in entrance examinations, of taking a technician's post or making the best of it with a job as a skilled worker is not always accepted with good grace. On the other hand, it is obvious that with the gradual extension of secondary education, it will no longer be enough to have completed secondary education in order to pursue university studies, and that the number of students completing secondary education who are forced to pass up higher education will only go on increasing.

Thus the competition waged in other countries for admission to highly selective secondary schools, which guarantee access to university-level studies, is waged in the USSR on this latter level. When secondary education develops much more rapidly than higher education, the barrier between these two types of education becomes more and more difficult to overcome, and the selection is intensified, whatever means of preparation are organized (preparatory courses for entrance examinations to higher education, etc.).

As the secondary school has now become a school of general and polytechnical education, with modernized curricula and increased emphasis on theory, the higher educational institution will tend to raise its level of admission and the requirement of preliminary training in industry will be made more flexible. However, even if, under these circumstances, the level of education is being raised, both in the secondary and higher educational schools some of the problems which the 1958 reform attempted to solve none the less remain.

The social problems still exist which arise from the generalization of secondary education. On the one hand, this generalization means for society a higher cultural level which is necessary for creative participation in contemporary civilization and for the development of science and technology, as well as a greater range of intellectual requirements.

On the other hand, for those who have reached this level, there may result, among certain groups a contradiction between the material conditions of life and the need to accept a job which is not at all in keeping with the education received. It would obviously be regrettable if the educational level of the masses were lower than required by living conditions as well as occupational situations and tasks; but the converse would also be disturbing, if the cultural level of the masses were too high as compared with the social and material conditions under which they must live and the nature of the work which they must perform. There must surely exist a rational optimum in the correlation between the rate of educational growth and the rate of economic development which determines living and working conditions for the population.

Has this optimum been correctly set in the USSR, both in practice, with the introduction of universal eight-year schooling and the recent extension to the ten-year system, as well as in the plans which foresee the introduction of universal ten-year schooling in future years? It is very difficult to give a comprehensive reply to this question, in view of the diversity and the enormous size of this country. It seems, however, that there are many regions where the introduction of universal ten-year schooling, which has already been 90 per cent achieved at present, does not cause any insurmountable difficulties.

The raising of living standards, the intensified development of intellectual institutions, the technical progress which reduces the number of manual workers and increases the demand for workers possessing specialized skills at the level of the secondary school-leaving diploma - all these factors lead us to think that progress in introducing universal secondary education is not outstripping economic possibilities or, if it is, then only to an extent which cannot fail to promote future economic progress.

If this conviction is confirmed in future years, this will mean that the USSR has been able to solve the problem of the introduction of universal secondary education in modern civilization. Not only will such a measure raise the vocational level of the working masses but it will also contribute to forming an enormous reserve from which it will be possible to recruit for higher educational institutions the most suitable candidates for scientists, technicians and professional people. The introduction of universal secondary education thus means new opportunities to make full use of the nation's intellectual resources.

Section III

EFFORTS UNDERTAKEN TO INCREASE THE EFFICIENCY OF THE SCHOOL SYSTEM

The introduction of the compulsory seven-year school (1949), then of the eight-year school (1958), and above all the increased admissions to the higher secondary grades, implied that considerable efforts would have to be undertaken to maintain the level of education and to limit and reduce the number of failures and repeaters.

A. CAMPAIGN AGAINST REPEATERS

The campaign against school failures and laggards assumed truly national proportions which mobilized parents, teachers, school and out-of-school institutions. In this undertaking, which was designed, if we may use the language of economics, to obtain a 'finished product' without any defects, the devotion of millions of teachers and their sense of professional responsibility were the essential elements; thanks to the hours of overtime devoted by teachers to help students who are poor in certain subjects and thanks to family assistance as well as the work of student groups, quite valuable results were obtained. Repeaters now represent over-all hardly 5 per cent of the total number of students; the Soviet school authorities were even able to tell members of the mission that in certain schools the number of repeaters had been reduced to nil during the last few years.

In fact, the members of the mission did not have access to specific statistics - particularly statistics on the age distribution of the students in the various grades - which would have enabled them to form an exact idea of this phenomenon and its recent development.

Until recent years, there is no doubt that, because of 'repeated' classes, a percentage of the students reached the age of 15 without having completed the eight-year school and left the school before grade 8, particularly to enter vocational schools. But there is now a trend to revise the regulations on this point and to admit to the vocational schools only students who have completed the first cycle of the secondary school, regardless of the child's age. This measure will no doubt enable all children to complete the eight-year school, but it does not guarantee that they will finish it in the time anticipated.

With the gradual development of the ten-year school and the constantly increasing admissions to grades 9 and 10, the problem of the elimination of repeaters is going to become even more complex. It seems impossible that all students attending the ten-year school will be able to finish it at the age of 16-17 by passing the final examination; thus, to the difficulties which are naturally encountered, because of the difference in individual aptitudes, in achieving complete efficiency of the school system in the lower secondary grades, we must add those which will result from universal admission to the higher grades.

B. INNOVATIONS IN TEACHING METHODS

The campaign against school laggards and failures mentioned above is only one aspect of the effort undertaken within the Soviet school to improve the quality of educational work.

School successes and failures depend to the highest extent on the competence of the teaching staff, its constant improvement, the excellence of the methods of teaching and auxiliary aids used (textbooks, audio-visual aids, etc.).

We shall consider below the systematic effort undertaken for teacher-training.

We may point out here that, generally, the student is the subject of great care on the part of the school; when his progress is unsatisfactory, he cannot be expelled but, on the contrary, must be given additional help.

This help is, above all, the duty of the teachers. The Soviet school does not as a rule, make use of IQ or aptitude tests. The teachers are required to observe the child in order to know him better and to do everything in their power to help the child improve his performance. Teachers receive effective assistance from youth organizations and the activities of the 'pioneer palaces'.

A new approach today makes use of active methods of teaching. It is true that many difficulties are encountered in introducing these methods in all schools and adapting them to all subjects. In this field progress can only be slow; it depends on the professional knowledge of the teachers, the elimination of 'two-shift' classes, and better physical equipment of the schools. It also depends on the progress of scientific research in education. The idea of 'teaching by active methods' is not yet clear and does not give any precise directives. It defines in a general way what education should be but not how to achieve it. In any event, the new curricula refer to the principle of active participation by the students in the learning process. The implementation of this principle and its success should contribute to raising the level of students with poor marks.

Only the combination of all these factors will make it possible to increase the effectiveness of educational work in the general secondary schools. Their effectiveness can only be judged by the results obtained in the course of future years. The experience acquired up to now allows us to assume that difficulties will be overcome even in the higher grades. The secondary school will be able to accomplish effective work even when it is open to all. The apprehension of foreign educators who feel that the introduction of universal complete secondary education will lead to a drop in the quality of education or, if the level is to be maintained or raised, that it may lead to an increase in the number of school failures, will probably not prove justified. This is why the enormous educational experiment of introducing universal secondary education in the USSR is so important and so useful for all other countries whose school system has reached, or is going to reach, a similar level of development.

Section IV PROBLEM OF THE DEVELOPMENT OF INDIVIDUAL APTITUDES

In the course of the development of education in the USSR, emphasis has been placed up to now on the fact that even the poorest students should obtain satisfactory results and not repeat a class; for some time now a new task has appeared whose scope seems no less important: this is the creation of the best possible conditions to enable students to develop their individual aptitudes and satisfy their own particular preferences. Of course, so far as possible, teachers have always more or less guided their efforts in this direction, but at the present time these efforts are not only being amplified but now tend to be integrated in a new educational organization.

Why does this problem arise especially today? The rapid progress of science and technology in modern economy calls for workers skilled in tasks which, in many cases, are of a more and more creative nature; this is the essential condition to increase the level of productivity and output of the various branches of the national economy. The educational system therefore must make it possible to mobilize and capitalize on all the potential of intelligence, aptitude and varying interests of youth. It is only in this way that an adequate number of workers will be found among young people who will be able to participate creatively in the development of science and technology.

A. 'HOBBY CLUBS' AND 'OPTIONAL' SUBJECTS

It is for this reason that in the new organization of secondary education more and more stress is placed on the need to develop systematically aptitudes and individual gifts and to apply active methods more boldly.

Hobby clubs, optional for the pupils according to their interests, have developed in the Soviet schools in the past few years. They meet usually in the afternoon after regular school hours once or twice a week (lasting one, one and a half, or two hours according to the subject) for pupils wishing to learn more about certain subjects of the regular curriculum (e.g., mathematics, music, etc.) or other subjects (theatre, etc.). Pupils may attend more than one of these 'clubs'.

The new school time-table, established by joint decision of the USSR Council of Ministers and the Central Committee of the CPSU on 10 November 1966, set the basic weekly programme at twenty-four lessons or class sessions (lasting forty-five to fifty minutes) for grades 1 to 4 inclusive, and thirty sessions for grades 5 to 10. This same decision, however, provided for the systematic organization in the schools of 'optional' (elective) courses at the rate of two sessions a week for grade 7, four a week for grade 8, and six sessions a week for grades 9 and 10.

The pedagogical function in these optional courses is designed to discover gradually the pupils' aptitudes and to develop their individual abilities. Optional courses do not constitute an obligation for the pupils, but each is allowed to select a maximum of two subjects[1] according to his or her interests and aptitudes. In grades 9 and 10, the elective instruction should provide an opportunity to raise the level in certain subjects to that of higher education and to take up additional subjects.

The provision for the teaching of elective subjects in the secondary schools does not of course interfere in any way with the 'hobby clubs', or special-interest clubs, which retain their own objectives.

Moreover, the very important out-of-school institutions and organizations must also contribute to this effort for the development of individual aptitudes and interests. The pioneer palaces, the youth houses, the clubs and cultural centres, the clubs for 'young technicians' and 'young naturalists', the choreographic and sports organizations, well developed and well equipped, enable many students to participate in the activities of their choice.

The network of these organizations which is becoming larger and better organized covers not only large and small cities but also prominent rural centres. Television facilitates this extension (the third channel is completely devoted to educational programmes)as does the free transportation of children and young people by all means of travel.

In this way the obstacle constituted by living at a considerable distance from scientific and cultural centres is reduced to a great extent, if not eliminated.

B. SPECIALIZED SCHOOLS AND CLASSES

The attempt to develop individual aptitudes has also been carried on for a number of years in another direction: the systematic organization of schools and classes with modified time-tables for specialization in certain disciplines or groups of disciplines. The intention was to extend the experience already acquired in classes, where the teaching of certain subjects is carried on with an expanded time-table, by organizing, in addition to the regular curriculum, theoretical and practical instruction corresponding to a certain specialization.

The possibility is also correlatively provided of reducing the number of hours devoted to subjects which do not belong to the dominant group of the specialization. Thus an hour of literature, history or economic geography may be eliminated in favour of mathematics in grades 9 and 10 with a 'mathematics' specialization and, on the contrary, an hour of mathematics, physics, or chemistry may be eliminated in favour of the subjects taught in classes with a 'humanities' specialization.

However, it must be noted that the reduction of the number of hours cannot be interpreted as a reduction, for certain students, of the curriculum of compulsory education. In all the courses and schools with different specializations, the curriculum of general education remains compulsory. The reduced number of hours devoted to certain subjects must be compensated by the personal work of the students. The importance thus given to personal work may be justified by the argument that, in modern civilization, workers must be able to take advantage of the education received and must know how to complete it by themselves. As no school, even the university, contributes a complete and final education, students must thus be accustomed, starting from secondary school, to personal intellectual work, and must develop the conviction that study is not confined exclusively to school hours.

It will be noted that the Soviet conception of the diversification of secondary school curricula differs in an essential way from the standards of organization adopted particularly in Western Europe and in the United States. In these countries there are various sections and types of general education curricula which are clearly differentiated. The Soviet conception does not lead, properly speaking, to a multiplication of types of secondary general education but rather to an additional enrichment of it in various directions. In other words, this conception tends to differentiate general education without affecting the common curriculum whose content continues to be fixed in such a way that students having diplomas may sit for the entrance examination of all types of higher educational schools.

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[1] Electives are offered in the following fields: mathematics, physics (including specialization in electronics), chemistry (including specialization in chemical technology), biological sciences and agrobiology, and the social sciences (including literature and philosophy).

The specialized schools are established especially to favour the teaching of mathematics and, to a lesser degree, of the physical and natural sciences. The educational organization of these schools depends on the geographic location and the number of students. Sometimes the school has only one or just a few specialized classes while the others follow the regular curriculum. Sometimes the school has only specialized classes and receives students from several regions; in this case, children living where the school is situated have the possibility of attending others when the specialization of the first school does not suit them.

Schools which are thus specialized usually have many candidates; for this reason they have an examination for admission to grade 9 which is occasionally highly selective (it happens that there are five times as many candidates as places). Some schools accept students without examination but only those who have obtained very good marks at the end of grade 8. Winners of the scholastic olympiads of which we shall speak again are also admitted without examination.

Teaching in the 'specialized' schools covers a quite advanced curriculum in the subject chosen. The classes of the 'mathematics' section have fourteen lessons weekly in the subject (six lessons on the normal time-table and eight additional lessons devoted to practical applications and to elective subjects) devoted to the study of mathematical theory as well as knowledge of its applications, particularly in the field of electronic machines.

Specialized classes in 'physics' or 'chemistry' are organized in the same way. The teacher of physics or chemistry has the time-table of the regular curriculum for grades 9 and 10 (five and four lessons for physics and three lessons for chemistry) as well as eight lessons devoted to technical applications and elective subjects. In these classes, the transition from theory to practice is made at a much higher level than in the regular classes. The students will thus probably be much better prepared for scientific and technical studies and for work in industry based on automation.

Secondary schools specialized in the study of foreign languages (there are 500 schools of this type in the USSR today) have an organization of their own. Unlike the schools mentioned above, the study of foreign languages begins much earlier, starting with the first or second grade. Admission to these schools is not determined by the children's aptitudes, since it is difficult to judge them at that age. It is the parents' preference, the child's wishes and, above all, his health which are decisive, for this school requires much work from the student. The hours of foreign-language instruction are added to the regular curriculum (four hours a week from grades 1 to 4, two to three hours from grades 5 to 7 and up to five hours in grades 9 and 10). Preparatory work at home is estimated at from forty minutes to two hours a day). Certain subjects in these schools are studied in the foreign language: mathematics from grade 4, geography from grade 6 and chemistry and history from grade 8. Textbooks specially published for the study of foreign languages facilitate teaching.

Secondary education given in the classes and schools of specialized orientation is developing relatively rapidly in the USSR and is favoured both by parents and children who are convinced that anyone attending these classes and schools has a greater chance to enter a higher educational institution. The general knowledge required for entrance examinations to higher education is as previously mentioned, the same for all secondary schools, but there is no doubt that the 'specialized' classes and schools prepare their students better for advanced studies corresponding to this specialization. As the entrance examinations for higher education are becoming more and more difficult, it is important to possess additional qualifications.

The completion of studies in a specialized school plays an important part in the choice of a future occupation; although an identical diploma marks the end of studies whatever be the school, a note mentions, however, that the student attended such or such 'specialized' school or class. Those with diplomas, when they do not go into higher education, obtain employment more easily or complete vocational schools more rapidly than those who have attended the regular secondary school. Although they have not received a definite professional specialization their more advanced knowledge in mathematics, physics or chemistry enables them to adapt more easily to technology and to hold responsible posts more rapidly.

Thus the soundness of the conception applied by Melnikov to school no. 710 in Moscow is confirmed; in this school, instruction was diversified on the basis of the future occupation of the students. At present, this school has kept its system of specialization by subjects. It prepares its students much better for advanced study and, at the same time, thanks to the equipment of its laboratories and to the high level of theoretical instruction, its students are much better prepared for professional life.

C. SCHOOLS FOR 'GIFTED' STUDENTS

1. Origin and organization of schools for 'gifted' students

Alongside the efforts described above to foster the various aptitudes of youth, another system is developing which is, however, related to the first; it consists in discovering as early as possible individuals gifted with exceptional aptitudes and in organizing a special system of education for them.

This method had first been applied for children who displayed special aptitude for music or dance. For a long time special music or ballet schools have existed in the USSR admitting children from the age of 7. There are at present 3,000 schools of this type which take their students as far as the conservatory. If, at the end of several years, the child's aptitudes do not justify the hopes placed in them, the child may be transferred to a regular secondary school to continue his artistic studies for non-professional purposes. Recently, secondary and higher schools have also been organized to meet the needs of the theatre.

This system has been extended to other fields and, in the first place, to mathematics. Even before the war the conviction had grown that mathematical aptitudes appear relatively early and should be systematically encouraged and developed. The president of the Academy of Sciences of the USSR, Keldysh, and the president of the Novosibirsk branch of the Academy of Sciences, Lavrentiev, urged, for the needs of science, that young mathematicians should receive special attention as early as possible and that they should be given an education whose methods and contents would be different from regular education.

The universities and higher schools as well as the Academy of Sciences of the USSR, its branches and the academies of the various republics have assumed responsibility for this special education; this assumes different forms, although certain basic principles have been generally adopted by the participants in this scientific and educational trend.

To single out young people particularly gifted for mathematics, 'mathematical olympiads' are organized.

The second stage consists of organizing systematic instruction for the young mathematicians thus selected. This instruction takes place in special schools or, if the students are placed in regular or 'specialized' secondary schools, it consists of additional courses taught by the academy or the universities. The additional courses are often taught by distinguished professors and have nothing in common with the usual school courses. The so-called special 'mathematics' schools provide general secondary education with an emphasis on mathematics. These are generally boarding schools which come directly under the universities or the academy.

For example, Moscow University ran a school for years in the form of correspondence courses for young mathematicians (beginning with grade 5); then it organized a boarding school which is now directed by Kolmogorov, the distinguished mathematician. Forty-five young mathematicians, of whom forty were admitted to the university, finished this school in 1965.

Other universities have organized similar schools. The physics and mathematics school of Novosibirsk University enjoys particular respect. It is directed by the distinguished mathematician, Liepounov, a member of the academy. The school recruits its students throughout Siberia by means of the olympiads. The organization of the olympiads is announced in October; in February, the best students take an oral examination in several centres in Siberia. In the month of August, the candidates selected are brought together in Novosibirsk for four weeks in a vacation camp; a final choice of students for the school is made among these young people. In 1965, 3,000 students entered the olympiads, 800 were qualified for the summer camp and 400 admitted to the school. Normally, the school lasts three years (grades 8, 9 and 10). Students are admitted preferably to grade 8, but also to the higher grades. The time-table, the curriculum and the organization of school work are different from those followed in other grades at this level; they have been prepared by Novosibirsk University and approved by the local branch of the Academy of Sciences. Mathematics (eight hours weekly), physics (eight hours weekly) and chemistry (three or four hours weekly) are taught. Other subjects are each allotted two hours weekly. In the last grade, students are oriented towards either mathematics, physics or chemistry. School work takes up five days a week and the other two days are devoted to rest, sport, tourism, and personal pursuits.

Instruction takes the form of courses (before 150 students) given by professors of Novosibirsk University and by members of the Academy of Sciences; supervised work is carried out in classes of twenty to thirty students or in groups of ten to fifteen persons. These methods of work are close to the methods followed in the university. Emphasis is placed on personal work, individual research and the solution of problems: there is no overburdening of the memory and much theory is introduced. The curriculum does not include any information on the technical applications of physics and chemistry; there are neither technical exercises nor manual work; no attempt is made to provide polytechnical education. Nor is the old regular curriculum of the secondary schools followed for it is considered that it is based on memory, that it creates intellectual mechanisms more than it develops the intelligence.

Above all, emphasis is placed in all the subjects taught on theoretical problems; in mathematics, considerable attention is paid to mathematical logic, the theory of probability and analytical geometry; in chemistry, emphasis is placed on theories which make it possible to understand the relations of chemistry and physics on the one hand, and biology on the other; in biology, the problems of evolution and ecology are emphasized. Theories of history and literature are not studied, but searching discussions are held on literary works of the past or present which bring out, in the former case, their relation to the present.

The school tries to develop a way of scientific thinking and to encourage correct and bold reasoning. To this end, all intellectual games are favoured: the students are asked to present scientific or technical projects from the realm of science fiction (for example, how to build a tower thousands of kilometres high, how to reduce the weight of the earth, how to pierce through the moon, ...). The students defend their position with all possible scientific rigour. These 'intellectual games' develop the scientific imagination while laboratory work provides exercises in precision and accuracy. During the last year of study, the students begin to participate in the scientific work of the Academy of Sciences, which admits them to its classrooms and laboratories. In this way they are able to get a taste of the atmosphere of scientific work and exercise their knowledge in this field.

The results of this method of education can be judged according to various criteria. About 10 per cent of the students drop out during their studies; the students take examinations twice a year; those who do not succeed in keeping up to the level required go back to regular schools. At the end of their studies, they take their graduation examination like all students in the secondary schools. On the other hand, the entrance examination to higher studies is only one more link in the process of selection; in 1964, out of ninety-three candidates, eighty-five were admitted to higher schools in Novosibirsk; in 1965, out of 110 candidates for mathematical studies, eighty remained in Novosibirsk, the others did not pass the examination. As may be seen, the school does not guarantee admission to university although the percentage of its graduates who are admitted is much higher than that of the regular schools.

The supervisors of the school attach particular importance to the progress of its alumni in the course of their university studies. In general, the progress of the students coming from this school is greater than that of the other students. The first year of university studies presents no difficulties for them, thanks to the training they have received and to the experience which they have acquired in the course of their laboratory work. It is expected that most of them will complete their higher studies sooner than the other students. They can take advantage of the year thus gained in order to start a scientific specialization earlier or to continue advanced studies in other universities. The school supervisors believe that the method chosen is the best one to speed up the training of a body of scientists; university circles share this opinion.

2. Advantages and disadvantages of the schools for 'gifted' children

With the increasing influx of candidates for higher studies and an increasingly difficult entrance examination, the problem of the training of students completing secondary schools becomes more and more acute. Some universities and higher schools organize preparatory courses for the entrance examination, but the results of these efforts have been poor. Moscow University has decided to eliminate these courses and to increase the number of special schools. Alongside the mathematics schools, physics and chemistry schools have been established; it is planned to organize a boarding school for students of the social sciences, but, in this field, many difficulties are still encountered in defining the criteria for the selection of candidates.

Certain teachers think that the development of a network of schools in which the students, chosen after careful screening, would follow a more advanced curriculum in certain subjects and would be taught by methods emphasizing the development of the intelligence and of scientific thinking is the surest way to raise the level of the university and the most effective means of obtaining rapidly a pool of qualified specialists.

But these ideas also meet with opposition. One may overlook the misgivings of some educators who maintain that schools of this type are harmful to the development of aptitudes in various fields. In any event, the question arises of determining to what extent these aptitudes should be considered as innate and to what extent they represent only the results of an appropriate education. Many people feel that the establishment of schools for 'gifted' students is a blunder which will lead to social inequality and produce arrogant and superficial young people. The method of the 'olympic' examinations used to discover outstanding aptitudes is described as based on an illusion. It is thought that the results obtained in this way are only accidental and that truly outstanding individuals are often passed over for one reason or another. This method is based on the assumption that aptitudes and intelligence are innate, whereas in fact they must be created and developed by an appropriate education. Consequently, it is necessary to offer an appropriate education to all youth and not reserve it for a certain élite.

However, this type of education could be carried out on a large scale only if the methods used were fundamentally changed. As Professor Leontiev of the University of Moscow said, all the teaching methods applied up to now have not yielded the hoped-for results and, in the best of cases, they teach the 'operations' of thought and not the 'action of thinking'. The teaching of the 'operations', even if it does yield results, is superficial; it does not develop the intelligence and its creative forces, it does not involve the student in what he is learning and what he is doing, it does not help him to conquer difficulties and to overcome the frustration which follows a failure. It may be that the new teaching method, the method of the future, will succeed in delving into the very processes of thought and will be able to give them dynamic shape. Leontiev thinks that the experiments undertaken by Elkonin in this direction, in the field of mathematics, in school no. 19, are particularly important. In this regional school, which cannot screen its students, an effective attempt is being made to 'open' all minds to mathematics. It turns out that in this school there are no children who are not gifted for mathematics. The development and extension of these new methods would perhaps be convincing evidence of the richness and diversity of the aptitudes of each individual.

Arguments of this type militate against the principle of special schools for 'gifted' children, a principle which justifies the early search for aptitudes and their development in certain individuals. However, it must be added that the prospect of such education for all children of school age is highly unrealistic. Indeed, not only is the level of teachers inadequate on the whole to provide such instruction, but, further, no scientifically tested methods are yet available.

Moreover, the immediate requirements of scientific and technological development, as well as of economic development, call for the rapid training of many gifted and highly intelligent people. For this reason, the schools which screen their students and teach them with the assistance of the most distinguished scientists of the country, plunging them thus very early into the atmosphere of scientific work, are in spite of all errors which may occur in the choice of students, a prompt and effective method. It is therefore not surprising that these schools are developing dynamically and that they enjoy the respect of parents and youth.

These findings lead us to conclude, and this is only an example, that the organization of social life always imposes difficult choices. From a theoretical point of view, one would have to recognize the soundness of a conception of education designed to develop the aptitudes and intelligence of all children. But, if we consider the present needs of society, we must perhaps accept the organization of a certain number of specialized schools for highly gifted students in various branches of science and of the arts. Consolation may be found in the fact that these two school systems, contradictory in principle, can co-exist and develop simultaneously, at least until the time when the progress achieved in the first system will be carried over to the second.

Section V TEACHER TRAINING

All stages in the development of education in the USSR have been accompanied by great efforts to raise the basic level of training of teachers and to improve their qualifications in the course of their career.

A. TRAINING INSTITUTIONS

The training of teachers is carried out in the USSR at a variety of levels and institutions. At the bottom, traditionally, are to be found the 'teacher-training schools'[1] which prepare men and women to be teachers in the primary grades and in kindergarten. They still exist today and many candidates continue to seek admission to them. In Moscow there are seven: three train men and women teachers for the primary grades and four train women as kindergarten teachers. Their curriculum follows on grade 8 and sometimes grade 10. In the first instance, the course lasts four years, in the second, two. In 1965, there were three to four candidates for each place on the grade-8 level examination, and 1.5 on the other examination. According to the directors of these schools, the candidates who apply at the end of grade 8 are the best elements; they choose this course more consciously; after four years of study they are better prepared from the professional point of view. Students completing secondary education who decide to enter a teacher-training school often do so only after having failed the entrance examination for higher education and their teaching vocation is on less firm ground.

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[1] These institutions are classified in the category of secondary specialized schools or technicums; their existence was challenged with the establishment of teacher-training sections in the Higher Pedagogical Institutes (see below). In fact, they continue to train the majority of new teachers at this level.

The higher pedagogical institutes, in principle, train secondary school teachers but, in recent years, sections for the training of primary school teachers have also been organized. The number of these institutes is growing. At present, there are 207 for the whole of the USSR, which represents 30 per cent of the number of higher schools in the country. Some of them are quite large. These institutes also organize evening and correspondence courses as well as instruction 'of the third cycle' ('aspirantura'). For example, the Lenin Pedagogical Institute in Moscow numbers 10,000 students, including 900 'aspiranty'; the Institute has seventy-three chairs and more than 100 practice teaching schools in Moscow. The proportion between the faculty and the students is 1 to 10 on the average and even 1 to 5 in the artistic sections. These figures show the importance of these centres of instruction and their faculty.

The universities also participate in the professional training of teachers. Some of the students who follow courses in disciplines taught in secondary education receive additional pedagogical education and, at the end of their studies, go into teaching in the secondary grades. About 15 per cent of the teaching staff in these grades comes out of the universities; in some regions of the country, this percentage rises to 35 per cent. The qualifications of these teachers are generally higher on the scientific level but their pedagogical training is more limited; they supplement it in the course of future years.

B. INSTITUTIONS FOR IMPROVING QUALIFICATIONS

One of the features of the Soviet system of education as compared with that of many Western countries is the important role assigned to specific institutions for improving the qualifications of teachers on the job.

This activity has two complementary purposes: (a) to enable teachers in service to acquire higher scientific qualifications through study courses leading to diplomas, organized essentially in the pedagogical institutes by correspondence; and (b) to improve the pedagogical methods of the teaching staff by full-time training courses in 'institutes for improving qualifications of teachers'.

1. Teacher-training by correspondence

The higher pedagogical institutes generally have specialized departments for training by correspondence; this is one aspect of the development of part-time higher education in the USSR (see the study of the Soviet authors); a total of more than 200,000 students receive advanced pedagogical training in this way. The complete study cycle lasts five years.

This instruction is intended almost exclusively for teachers in service and it has a twofold role:

A 'make-up' role. For in-service teachers of grades 5 and 6 who had received the old reduced higher training[1] and who are obliged to acquire the necessary qualifications or even for those who took up their duties without having completed higher studies; this 'make-up' aspect affects 80 per cent of the 200,000 registered.

A promotion role. For teachers of grades 1 to 4 who wish to acquire the qualifications necessary to teach the secondary grades.[2]

The Pedagogical Institute by correspondence in Moscow plays the role of 'a pilot institution' for the organization of this training; it draws up the methodological directives for all departments of education by correspondence in the USSR; it prepares the textbooks used for this type of education.

2. Institutes of further training for teachers

There are 170 institutes for further training of teachers in the USSR; their role consists in improving the level of pedagogical work through the organization of specialized short-term courses - one month, in general.

The essential effort bears on knowledge of, or

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1. The old two-year training following the secondary school diploma given in 'teachers' schools which constituted a category of technicums.
2. Certain teachers of grades 1 to 4 confine themselves to preparing by correspondence for the diploma of the higher pedagogical institutes which corresponds to these grades without aspiring to teach the secondary grades but, when they have obtained the diploma, they are paid as secondary school teachers.

experimentation with, new pedagogical methods (active methods, use of audio-visual aids, programmed instruction, etc.). The courses include practical exercises at the institute and in its practice-schools, as well as theoretical courses given by the professors of the institute or other higher schools of the locality.

In principle, the development of the network of institutes for further training should enable all teachers, school directors, and inspectors to enjoy such a training course[1] every five years. In addition, each institute contributes direct assistance to teachers who undertake pedagogical research.

On the whole, all these activities - to which must be added the many publications of popularized science prepared for the most part by the Academy of Sciences of the USSR, which are of great assistance to teachers - constitute a characteristic aspect of the Soviet system of education. Along with this systematic effort of the Soviet authorities constantly to improve further the level of education, there is a corresponding eagerness on the part of teachers to learn and further improve their professional training. This convergence of the efforts of the authorities and the aspirations of teachers justifies the hope that the ambitious targets which the Soviet educational system has set itself will be achieved.

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[1] During the visit on 25 September 1965, of the IIEP mission to the Central Institute for Further Teacher Training in Moscow, three courses for 300 persons were under way; they were intended respectively for directors of pedagogical technicums, inspectors of school districts and kindergarten teachers.

Chapter 3

Development of the educational system and manpower requirements

INTRODUCTION

The development of education constitutes one of the essential factors which must lead to the achievement of the two fundamental objectives of communism, namely, the liberation of man from economic alienation by the creation of an affluent society and his liberation from intellectual alienation by the opportunity which must be given to everyone to develop his aptitudes and to enjoy all spiritual values.

On the one hand, the development of general education constitutes the favoured instrument in the struggle against intellectual alienation, and the authors of the Soviet study affirm in this connexion that the level and quality of general education determine the degree of man's development with respect to principles, morality and esthetics.[1]

On the other hand, the construction of the communist society whose economic and social targets for the year 1980 have been defined in the 1961 programme of the twenty-second congress of the CPSU requires 'a considerable increase in the output of labour', which can be achieved only by the ever greater use of modern techniques of production, i.e., by the maintenance of a high rate of capital investment, but also by a systematic improvement of the vocational qualifications of the workers.[2]

Thus the cultural development of the masses and the development of the technical and vocational qualifications of the workers, at all levels, are the objectives which the construction of a communist society imposes on the Soviet educational system. These two obligations are obviously not contradictory but, quite the contrary, complementary, and academician Strumilin was able to show, as early as 1924, the beneficial effects of elementary general education on the productivity of manual workers.

However, in general as in technical and vocational education, the Soviet planners have been compelled, in the course of the successive plans which they have prepared since 1927, to adopt 'realistic' positions, i.e., their objectives have been subordinated to the real economic possibilities of the moment.

No doubt a certain level of development of general education among the masses and the availability of a minimum of skilled and highly skilled labour are necessary conditions for economic development, but, conversely, the Soviet authors correctly state in the introduction to their study - and this deserves reflecting on by leaders of developing countries - nor can a high level of education be provided for the working masses unless it is supported by a well developed economy, since education cannot progress and prosper without a sufficiently high output of productive labour.

In other words, whatever the desirability of developing general education from the point of view of labour productivity, the cultural level which can be given to the workers through 'formal' education must be proportionate to the economic possibilities, particularly because of its own financial implications and the concomitant necessity (especially during the 'take-off' period of the economy) of making large capital investments.

For these reasons, Soviet school policy could appear, to certain foreign observers, as fundamentally dominated by economic requirements, and, particularly, by the requirement to train manpower for technical and vocational purposes.

Such an interpretation is refuted by the facts themselves; in spite of the delays caused by the devastation of the Second World War, the rapid progress of the Soviet economy made it possible, from the end of the 1950s, to begin to give more concrete shape to the cultural objectives of communist society: with the seventh plan (1959-65) eight-year schooling was extended to all and the second secondary cycle (grades 9 and 10) was considerably expanded; with the eighth plan (1966-70), the physical base is to be established which will enable all Soviet youth, during the first years of the 1970s, to attend the complete secondary school (ten-year school) or to receive an equivalent culture (see chapter 2).

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[1] See page 21 of the Soviet authors' study.

[2] See page 175 of the Soviet authors' study.

Some may object, it is true, that the 'polytechnical' nature of the Soviet school of general education, especially since the 1958 reform, is evidence of a continuing concern with vocational training within general education itself: the IIEP mission has dealt with this problem in chapter 2 of this report and we shall not revert to it here except to recall that, taking into consideration the adjustments made in the reform in 1964 and the new curricula which were prepared in 1965/66, polytechnical education seems today to be essentially an attempt to create a new type of general education truly adapted to the modern world.

Without prejudging its results, we have emphasized the great importance of this attempt for all those concerned with bringing up to date the content of 'modern' education at the secondary school level.

From the point of view which has just been mentioned, it may be admitted that the efforts of the Soviet planners were, to a certain extent, devoted at first more to the preparation of skilled manpower and executive staff than to the purely cultural aspects of the development of the educational system, but nothing indicates that this choice constituted an end in itself; on the contrary, the priority temporarily given to the economic aspects of the development of the educational system was only a means to reach in the shortest possible time the twofold economic and cultural objective which the construction of communism had set itself.

Thus, refraining from any questioning of motives which would be, under the circumstances, as unfair as it is unnecessary, it is of the greatest importance for the planners of all countries to seek to understand how, starting with the situation existing in 1927, the Soviet authorities solved the manpower problems resulting from the intensified programme of industrialization adopted with the first five-year plan.

Part Two of the Soviet authors' study is devoted to complete and detailed analyses bearing upon the methodology of the planning of educational development in the USSR and the determination of requirements for qualified specialists, and also upon the definite implementation of the successive plans in these fields. We shall assume that the reader is familiar with this information and shall therefore confine ourselves in this field:

1. To recalling briefly the methodological links which connect educational and manpower planning in the USSR (section I below).
2. To studying from a historical point of view how the qualifications of the active Soviet population have developed in relation to the fulfilment of educational development plans and what the future prospects are in this field (sections II and III below).
3. To submitting our own reflexions on the value, the difficulties and the limitations of long-term manpower forecasts and on their use for planning the development of the educational system, as they appear in the light of the long and varied Soviet experience (conclusion).

Section I NATURE AND IMPORTANCE OF THE LINKS BETWEEN MANPOWER PLANNING AND THE DEVELOPMENT OF THE EDUCATIONAL SYSTEM

In all countries, the link between general economic planning and the planning of the development of the educational system presents three main aspects:

1. Quantitative and qualitative manpower requirements, as they appear in the light of forecasts for the development of the various sectors of the economy, must guide the development of the educational system, particularly for everything affecting the different levels of technical and vocational education.
2. The share of the education plan devoted to the cultural advancement of the mass of the population, i.e., essentially the development of general basic education prior to all specialized training, is an important aspect of the social objectives of the plan.
3. The financial balances of the general economic plan must include the financing of the desired expansion of the educational system; the inevitable limitations resulting therefrom may affect the choice of priorities and objectives.

Educational development plans in the USSR, prepared, as has been said, taking account both of the requirements of manpower training as well as of purely cultural objectives, have been subject, like all others, to these financial limitations. We shall come back to this point in the last chapter of this report.

As regards more particularly the relationship between the growth of manpower requirements and the development of the various parts of the educational system, Soviet planning is based specifically on two techniques: (a) the preparation of 'manpower balances' or 'balance-sheets'; (b) the preparation of medium- and long-term forecasts showing requirements for skilled and highly skilled personnel.

A. 'MANPOWER BALANCE-SHEETS' AND THE DEVELOPMENT OF THE EDUCATIONAL SYSTEM

Chapter 1 of Part Two of the Soviet authors' study gives a precise definition of the purpose and the methods of preparing manpower balance-sheets. This is one of the fundamental operations of economic planning since it is concerned with seeking a balance between manpower requirements during the plan period (for the whole of the USSR, by republics, by regions, etc.) as they appear from the prospects of planned development of the various branches of the national economy and the resources available during the same period, as they result from the natural development of the Soviet population and the rates of activity by age-group which it appears possible or desirable to reach.

This enormous task constitutes one of the major tests of the consistency between the production targets of the plan and the available manpower resources which really exist in the population.

These comparative balance-sheets make it possible to work out specific measures designed: (a) to ensure the most effective employment of all the population of working age, the purpose being, according to the Soviet authors 'to maximize production while reducing to a minimum the amount of labour required for this purpose' and to create for the full employment of all Soviet citizens of active age; (b) to redistribute manpower among the various sectors of the national economy and the various geographic regions; (c) to plan the training of specialized and skilled workers (training in vocational and technical schools and training on the job)[1] (d) to place young people completing study in eight-year and ten-year schools, technical and vocational schools, secondary specialized schools, universities, etc., in productive work.

In the preparation of the manpower balance-sheets, the most accurate account possible must be taken of the duration of compulsory schooling and of the progress of schooling after the compulsory period, since the development of that part of the educational system which continues after compulsory schooling will lead to a reduction, in due course, in the rate of activity of young people and in the immediate availability of manpower.

It could be thought, particularly on the assumption of a labour shortage - and this might have been the case in the USSR after 1945 as a result of the heavy casualties caused by the war - that the conclusions of the manpower balance-sheets might lead to a limitation in the development of schooling. This possibility was raised with the Soviet planners by the IIEP mission. The authors of the Soviet study, without denying 'the great influence' of the manpower balance-sheets on school planning, point out that this influence cannot be 'decisive'[2] in so far as the length of full-time compulsory general schooling is determined by law (seven years since 1949, raised to eight in 1958 and to ten years effective by 1970) and inasmuch as the requirements of the economy for specialists call for adequate development of technicums and institutions of higher education.

This answer fails to deal with the effects a labour shortage might have: (a) on restricting admission to the final grades of the ten-year school[3]; (b) on the proportion of workers trained 'on the job' and in school; (c) on the constantly increasing development since 1950 of the training of 'specialists' 'without interrupting production' (evening and correspondence courses).

In fact, as regards the development, during the last two decades, of grades 9 and 10 of ten-year schooling, manpower requirements do not appear to have had any limiting effect on the spontaneous demand of families to have their children complete the final secondary cycle since, on the contrary, the percentage of graduates of the ten-year school in relation to the 17-18 year age-groups rose from 5 per cent in 1950 to almost 30 per cent in 1958[4] and since, according to the supporting information obtained during the mission's visits, the rate of admission to grade 9 has been constantly on the increase since that date, as a corollary of the policy of generalizing the ten-year schooling. There is therefore today no restriction at all against admittance to the higher grades, but on the contrary, it is encouraged by all levels of authority.

On the other hand, the answer might perhaps be more qualified with respect to the part played by manpower balances in the choice made by Soviet planners among the various possible methods of training skilled manpower and specialists (full-time in school, part-time 'without interrupting production' or in factories). From this point of view, it is probable that the pressure of manpower requirements has influenced the development of so-called education 'without interrupting production'. But this factor is certainly not the only one and does not even appear to be the most important.[1] Other factors of a social nature and, above all, the inevitable financial limitations are no doubt of greater weight in choosing among the various possible methods of training; we shall come back to this point in chapter 4.

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[1] See Part Two, chapter 3, of the Soviet authors' study concerning the planning of vocational and technical education (preparation of skilled manpower); this problem will not receive special attention in this report.

[2] Page 94 of the Soviet authors' study. This passage is in answer to a question specifically asked by the mission.

[3] A problem which is often raised by foreign commentators on Soviet manpower and school policies.

[4] The percentage is already expected to reach 70 per cent for the school year of 1967.

The information and figures obtained by the mission do not enable us to determine the respective weight of each of these factors in the decisions of the Soviet planners.

B. METHODOLOGY OF FORECASTING REQUIREMENTS FOR 'SPECIALISTS'

The expression 'specialists' which is used in the terminology of the Soviet planners refers to the middle-level manpower and senior staff whose training is provided in the USSR in secondary specialized schools (technicums) and institutions of higher education (universities and specialized institutes).[2]

The training of the personnel necessary for the development of all branches of the national economy and of cultural activities has constituted, from the outset of planning, one of the major problems for the Soviet planners and still remains one of their constant concerns.

Because of the acute shortage of trained personnel which existed in the USSR in 1927 and the enormous needs which opened up with the programme of accelerated industrialization under the first five-year plan, this plan had to provide for a broad expansion of these types of training institutions. The statistics in table 29 of the Soviet authors' study show the magnitude of the achievements of the first five-year plan: the number of institutions of higher education increased from 152 in 1928 to 832 in 1932, that of technicums from 1,051 to 3,509; it may be said that the backbone of the present network of institutions training 'specialists' in the USSR dates for the most part from this time.

But what was the magnitude of the respective requirements of the various branches of the economy? In which specialities was there a particular need to develop training? Since it was not possible to meet all requirements in the short run, how were priorities to be determined?

To reply to these questions, the Soviet planners found it necessary to work out, beginning with 1927 - and this constitutes a unique occurrence in the history of industrialized societies - methods, as rational as possible, for forecasting requirements for specialists.

From the outset, two methods have been used: (a) one, more comprehensive, is based on an extrapolation of trends in the staffing of the various branches of economic and cultural activity. This is the so-called 'saturation-rate' method ('koeffitsient nasyshchennosti')[3]; (b) the other, more analytical, is based on detailed surveys carried out in factories and departments, designed to ascertain their trained-personnel requirements during the plan period on the basis of a nomenclature of positions to be filled by 'specialists' who have received secondary specialized or higher education ('nomenklatura dolzhnostei').

The two methods have been applied since the first five-year plan (1928-32)[4] and still remain in use. They have been continually improved, particularly at the end of the fifth five-year plan, following the decisions of the Council of Ministers of the USSR in 1954.

The Soviet authors, in chapter 4 of Part Two of their study devoted to the planning of secondary specialized and higher education, have explained each of these two methods in detail, and we do not propose to describe them again except to summarize their purpose and their original features, as an introduction to our own reflexions on their application at the end of this chapter.

The purpose of these estimates is, in the first place, to calculate the total number of 'specialists' likely to be employed during the plan period, taking into account the development targets laid down by the plan for the various sectors of activity.

On the basis of the estimate of the desirable 'stock' of 'specialists', the recruiting requirements are determined (by adding to the new requirements for each year of the plan the 'replacements' of all kinds[5] which may occur during the period).

Lastly, the recruiting requirements established by specialities make it possible to determine, year

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1. The rapid development of the active population (between 1955 and 1963, see table 14 of the Soviet authors' study) does not indicate a manpower crisis, quite the contrary; moreover, for several years Soviet planners have been more concerned by 'the liberation of the workers resulting from technical progress' than by a quantitative shortage of labour.
2. The role and organization of these institutions are set forth in Part One, chapter 3, of the Soviet authors' study.
3. The word 'saturation' does not imply the idea of maximum but rather the idea of a desirable or 'optimum' rate.
4. First five-year plan for the training of specialists (engineers and technicians), published in 1930 (V. S. N. Kh. SSSR, Piatiletnii plan podgotovki inzhenernotekhnicheskikh i ekonomicheskikh kadrov v promyshlennosti, Moscow, 1930).
5. Retirements, deaths, partial replacement of 'praktiki' (practical workers) holding a specialist position without the corresponding diploma, etc.

by year, the admission quotas[1] for educational institutions (technicums and institutions of higher education) and, hence, the development plan of these institutions.[2]

Thus, the estimate of the requirements for specialists constitutes the basis for planning their training by schools.

1. Method of estimating requirements for 'specialists' on the basis of the nomenclature of positions[3]

The point of departure of this method is the preparation for all branches of activity (industrial, agricultural, trade, and transport enterprises, cultural activities, health services, etc.) of a nomenclature of positions which must normally be filled by 'specialists', i.e., by graduates of technicums and institutions of higher education; for each of the positions thus defined there is a corresponding indication of the level of education (secondary specialized or higher) and a precise indication of the speciality required. Annex XIV of the Soviet authors' study gives an example of such a nomenclature for railway transport.

Of course, as we shall see below, all of these positions are not yet actually held by graduates; many are still filled by 'practical workers' ('praktiki') who make up for lack of a diploma by their vocational experience. However, with the development of training by the school, the so-called 'specialist' positions tend gradually to be reserved for graduates and plans for admission to educational institutions are prepared accordingly.

To the jobs listed in these nomenclatures prepared for the various branches of activity correspond the various specialities prepared for in higher educational institutions (annex X) and in the technicums (annex XI); the nomenclatures of positions and the lists of specialities are, of course, modified in keeping with changes in technology.

It will be noted that, in final analysis, this method is based on a judgement of the level of qualifications required for the various specialist positions, i.e., on as rational a determination as possible of the equivalence 'position-qualification'. Because of the effect of these equivalences on salaries, the nomenclatures are prepared by the various ministries or administrations concerned in accordance with the USSR Gosplan, the Ministry of Finance, the Ministry of Higher and Specialized Secondary Education, and the USSR Council of Ministers' State Committee on Manpower and Salaries.

The requirements of the various enterprises or administrations estimated according to this method are transcribed on standard forms laid down by the USSR Gosplan and the Ministry of Higher Education (see annex XII), then collated at the various levels of the administrative ladder.

Medium-term forecasts of requirements corresponding to the duration of a plan (five years, normally) are submitted at the time of preparation of this plan and may be used, at least in part, for the preparation of training plans; forecasts of requirements for the next year are prepared each year and are used for the final formulation of plans for the distribution and placing of young specialists graduating from educational institutions.[4]

The Soviet authors mention[5] that, more and more, the questionnaires completed by enterprises include information on the total number of jobs and the number of various specialist positions; this information makes it possible to know, by branch of activity, the proportion of specialists in the total working population and the relationship between the number of specialists with higher education and the number with secondary education. Table 42 of the Soviet authors' study shows the development of these proportions from 1940 to 1963 for each of the main sectors of activity.

The Soviet authors clearly bring out the fact[6] that the method of the 'nomenclature of positions' is based essentially on 'the concrete plans of development of the national economy and culture'. It thus has the advantage of closely linking the economic development plan adopted by the Soviet authorities with the development plan for secondary specialized and higher education and of being based on sound economic forecasting. Conversely, it makes it possible to estimate the requirements for specialists only within the limits of the plan itself, i.e., generally, five years in advance or, exceptionally, seven years[7]. For this reason, it does not allow the long-term forecasts (nine to eleven years in advance) which are essential for the preparation of admissions plans (particularly in higher education) and for the planning of the physical infrastructure of educational institutions and the planning of the recruitment of their teaching staffs during the whole of the five-year plan.

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[1] These admission quotas include all methods of training (full-time, evening and correspondence courses) since each of them contributes to satisfying the requirements for specialists.

[2] See p. 153 and following of the Soviet authors' study.

[3] See p. 139 and following of the Soviet authors' study; this method is also called the 'staff normative method' ('metod normal nykh shtatov').

[4] See p. 160 and following of the Soviet authors' study.

[5] See p. 140 of the Soviet authors' study.

[6] See p. 145 of the Soviet authors' study.

[7] This job-listing method can, in fact, be used to estimate manpower requirements of new enterprises, the material establishment of which will be financed in the latter years of the eighth plan (1966-70) and which will be put into operation in 1971 or 1972.

For this basic reason, a second method of estimating the requirements for specialists, called the 'saturation rate' method, is used along with the first method.

2. Method of estimating requirements for specialists on the basis of 'saturation rates'[1]

Whereas the so-called 'nomenclature of positions' method is applied on the basis of the concrete medium-term plans known for each enterprise or department, the 'saturation rate' method is based on an over-all view of the longer-term development of the active population, its distribution by main branches of activity and the relative proportion of specialists in each of these branches.

The main stages in this work of forecasting are the following:

1. Estimation of the active population on the basis of general population forecasts.
2. Forecasts of the distribution of the active population among the main branches of the economy, taking into account the long-term trends and outlook plans which may be formulated on the development of output and productivity in each branch.
3. Studies of the proportion (for 1,000 workers) of specialists with secondary and higher education in the various sectors of activity (economic, cultural, etc.) and of the past history of this proportion;[2]
4. Extrapolation, according to methods peculiar to each of the branches of activity, of the trends noted in the development of the staffing pattern down to the end of the plan period.[3]
5. Corresponding estimates of the 'stock' of specialists necessary in the course of the various years of the plan period, from which additional requirements[4] and training plans are deduced (admission quotas to the various educational institutions).

However, these calculations only make it possible to estimate, by branch of activity, the total numbers of specialists, which then must be broken down into groups of specialities and into specialities in order to prepare training plans. This breakdown involves further methodological difficulties; the present structure of the various branches of activity and its recent development must be analysed and, without extrapolating in a mechanical way, an attempt must be made to imagine the future structure of specialities (ten to fifteen years in advance) by an analysis of the known trends[5] or by the study of the structure of the most modern enterprises.

These estimates prepared by the 'saturation rate' method refer to general indices by branches of activity and can be immediately reduced to mathematical language, making it possible to use computers.[6] However, to the extent that these estimates are based largely on an extrapolation of recent trends or those which are anticipated in the near future, the 'saturation rate' method relies in fact on the results of the previous method. Thus the two methods used appear both as competitive - for the period of the five-year plan - and as complementary.

3. Complementary nature of the two methods of forecasting used

The Soviet authors clearly show[7] how the two methods are used simultaneously within the period of a five-year plan and how they complement each other.

1. The nomenclature method yields relatively accurate data, thanks to the questionnaires sent to enterprises and departments on the development of staffing patterns during the plan; for example, for the eighth plan, it provides a detailed picture of the structure of the active population until 1970; for this same data, it furnishes information on the over-all staffing patterns and on the breakdown of specialist positions between the two main levels (secondary and higher) and among the various specialities. The information thus furnished for 1970 constitutes an essential step for the later extrapolations which are carried out with the 'saturation rate' method.
2. The simultaneous use of both methods during the five-year period of the plan allows reciprocal comparison and verification. In particular, the application of the 'nomenclature' method, for the 1966-70 plan, makes it possible to compare its results and the forecasts which had been made previously, for this same period, during the preparation of the seventh plan by means of the saturation rate method; the Soviet planners can thus draw useful conclusions for the application of this second method to their extrapolations beyond 1970.
3. Conversely, the results of the questionnaires and surveys sent out to the enterprises (method of nomenclature of positions) are not necessarily satisfactory, either because the enterprises

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[1] See p. 145 and following of the Soviet authors' study.

[2] Table 44 shows these proportions for 1963.

[3] Annex XVII of the Soviet authors' study gives an example of this type of extrapolation.

[4] After replacement requirements have been studied, as has been said, by the 'nomenclature' method.

[5] Development of new specialities such as electronics, biology, and applied mathematics.

[6] See p. 151 of the Soviet authors' study.

[7] See p. 151 and following of the Soviet authors' study.

pad their real needs or because they minimize them. The comparison of these results with the extrapolations obtained by the saturation rate method makes it possible to narrow down certain difficulties and better to appreciate the real problems.

To sum up, as early as the first five-year plan, the Soviet planners worked out methods for forecasting the requirements for specialists which they needed in order to formulate their training plans and these methods have been constantly improved in the light of experience. Nevertheless, in spite of the considerable means made available for their implementation, their use continues to involve difficulties which are inherent in the very nature of the problems encountered. We shall return to this question in the final part of this chapter.

Section II DEVELOPMENT OF FACILITIES FOR SPECIALIST TRAINING

CHOICE OF PRIORITIES AND THE TREND IN THE QUALIFICATIONS OF SPECIALISTS FROM 1928 TO 1950

The use of these methods of forecasting as early as the first five-year plan (1928-32) does not mean that at this time or even during later plans all specialist positions could be filled by graduates; quite on the contrary, we shall see that during the first four plans a considerable, if not increasing, share of middle-level and senior specialist positions went on being held by those 'trained on the job'. This situation, which changed appreciably only after 1950, may appear paradoxical in view, on the one hand, of the effort to forecast requirements which has been summarized above and, on the other hand, of the development of training facilities undertaken as early as the first plan (see table 29 of the Soviet authors' study). It is explained, however, by the following two essential reasons.

1. The inevitable delays which are encountered at the outset by the development of any educational system, especially at the high level of specialist training; not only did the necessary physical facilities have to be created but it was also necessary to recruit a sufficient number of students trained in the secondary schools - which assumed a previous development of these schools[1] - and above all, it was essential to have at all levels adequate and competent teaching staffs, whose training required considerable time; to these prerequisites must be added the time required for training the specialists themselves.
2. Independently of this phenomenon of 'inertia' peculiar to the development of any educational training system, the financial conditions resulted in inevitable limitations.

In other words, the delays in the 'take-off' of the system for specialist training were such in the course of the first five-year plans that the progress in the rate of entry of graduates into the economy was very much below the increase in requirements resulting from industrialization plans, so that the Soviet economy was then plagued by a shortage of skilled workers and specialists; this shortage had, moreover, been clearly perceived by the authors of the first plan; for example, one may read in this connexion in the official comments[2] on the targets of the second year of the first five-year plan 'that the requirements of the national economy for specialists during the years 1929-30 are enormous'; but that 'the possibilities of meeting them[3] are extremely limited'.

Therefore, if one attempts to discover why certain decisions rather than others were taken during the first five-year plans, the answer to all the questions one may ask is not to be found in the strict planning of manpower requirements and specialist training. In this period of shortage, the solution to the major problems was found by using various techniques; namely: concentration of effort on selected and limited targets, widespread use of out-of-school methods of training ('on the job') and the hope, which proved justified to a large extent, that available manpower would adapt itself to the changes in the structure of the economy.

In order to understand the most recent developments in the planning of specialist training in the USSR, they must be placed in historical perspective. This perspective constitutes, moreover, particularly for the developing countries, one of

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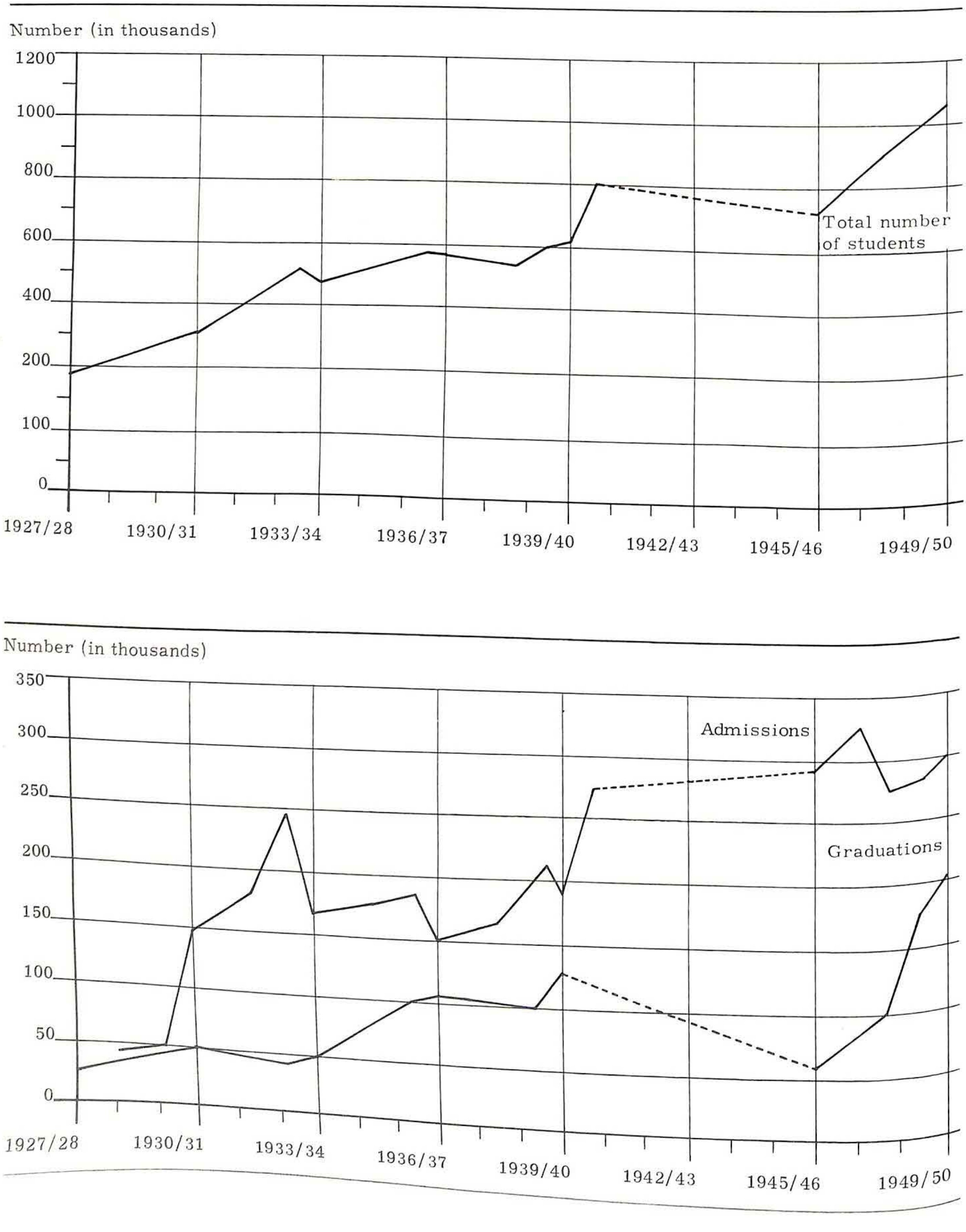
[1] The creation of the 'rabfaks' in 1920 was one way of speeding up the preparation of candidates for higher education (see p.118 of the Soviet study).

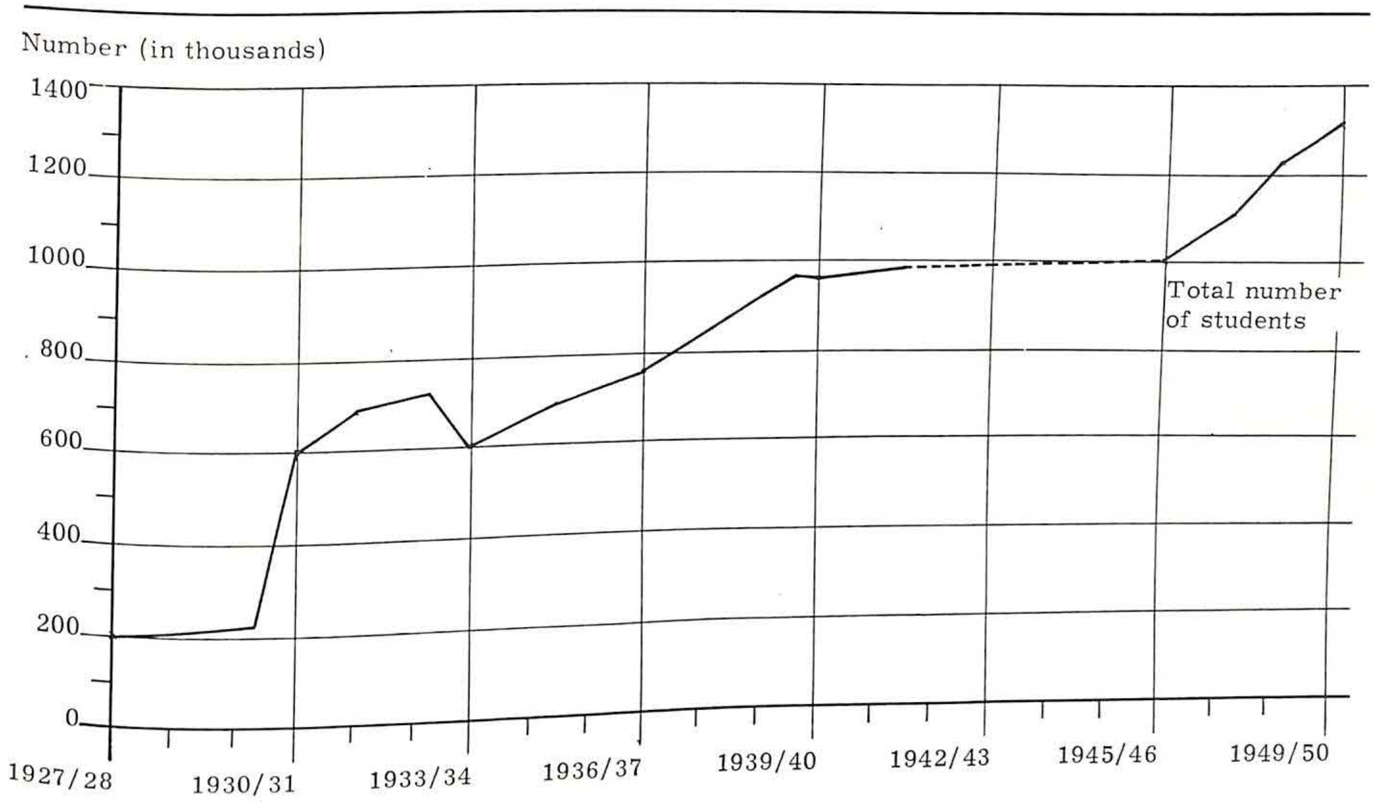
[2] Narkomtruda, SSR, Kontrol'nye tsifry po trudu na 1929/30 god, p.67-69, Moscow, 1930.

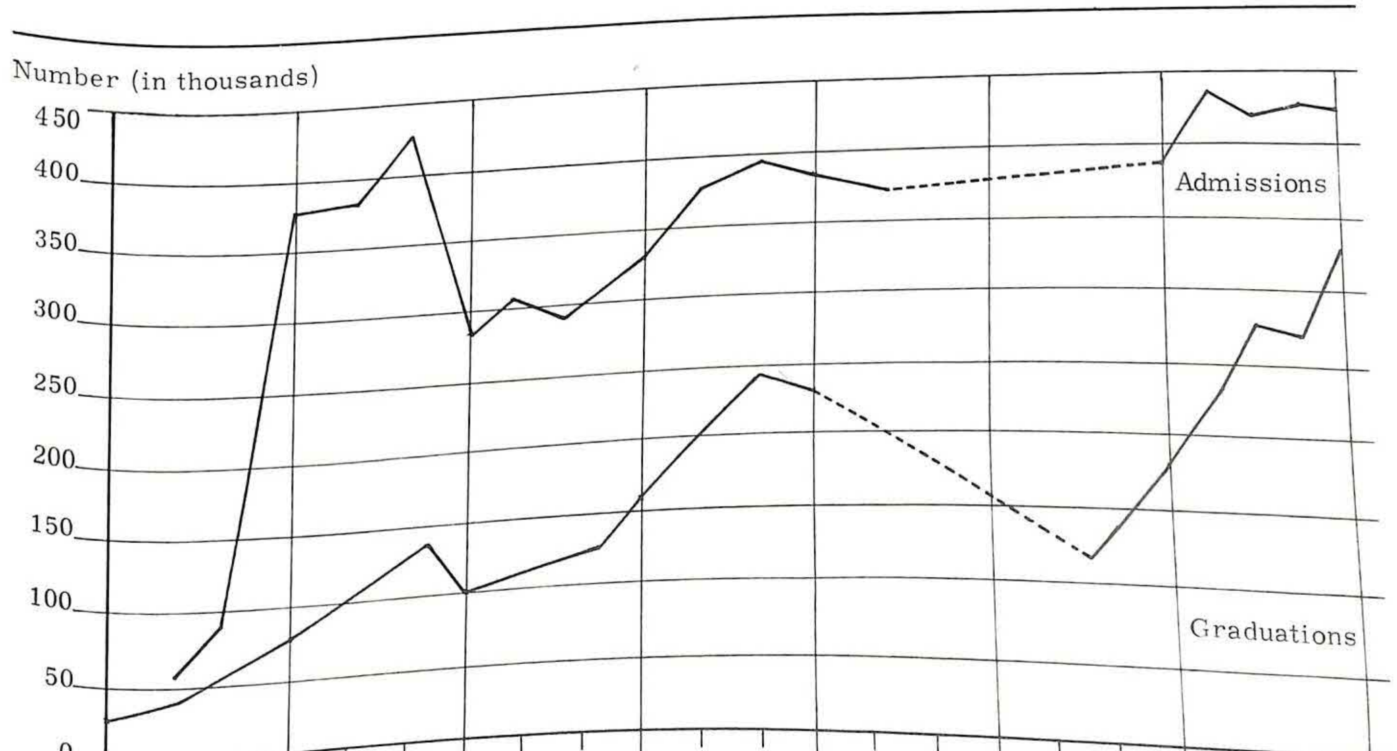
[3] By training in specialized secondary and higher educational institutions.

Graph I. Trend in the total numbers of students, admissions, and graduations in USSR higher educational institutions, from 1927/28 to 1949/50



Graph II. Trend in the total numbers of students, admissions, and graduations in USSR secondary specialized educational institutions, from 1927/28 to 1949/50





the most valuable aspects of the lessons to be drawn from the Soviet experience.

To do this, we shall consider successively the situation with respect to the qualifications of specialists working in the Soviet economy on the eve of the first five-year plan and the development of the situation during the period 1928-50. Section III will be devoted to the new features of the 1950-60 decade and to the prospects opened by the eighth plan (1966-70).

A. LEVEL OF QUALIFICATION OF SPECIALISTS IN THE SOVIET ECONOMY ON THE EVE OF THE FIRST FIVE-YEAR PLAN

After the 1917 Revolution, the active population of the USSR included only a very small percentage of engineers and technicians (specialists) with secondary and higher education, and from the very earliest years of the Soviet régime efforts were undertaken to establish training institutions. Table 28 of the Soviet study shows that after the destruction of war - as early as 1927 - the educational training system had not only been entirely reconstructed but actually enlarged. The rate of increase for the year 1927/28 in comparison with the year 1914/15 is 32 per cent for the number of students in higher education and 250 per cent for the number of students in secondary education.

The number of graduate specialists employed in the economy in 1928 (521,000) was already 2.7 times higher than the corresponding number in 1913 (190,000)[1] but in 1928 only a small proportion of the positions considered as requiring specialist training were as yet held by these graduates.

According to Soviet statistics, on the eve of the first five-year plan, three-fifths of the middle-level and senior specialist positions in industry and four-fifths of similar positions in the economy as a whole were held by non-graduates. Such a situation, of course, was not peculiar to the USSR alone at that time. However, it deserves mentioning in order to underline the considerable lag in the preparation of engineers and technicians in comparison with the industrialization of the country.

B. CHANGES IN THE RATE OF SPECIALIST[2] TRAINING DURING THE FIRST FOUR FIVE-YEAR PLANS (1928-50)

Graphs I and II (p. 262 and 263) show the trend in total numbers of students, admissions and graduations year by year from 1927/28 to 1949/50 for institutions of higher education and secondary specialized schools respectively. These two series of statistics are highly similar.

During the first plan, admissions to higher education rose from less than 50,000 in 1927 to almost 250,000 in 1932 and, in the technicums, from about 60,000 to 486,000 during the same five-year period; total enrolments in higher education increased from 168,000 to 504,000, and from 190,000 to 724,000 for the technicums; these figures give an idea of the unusual amount of effort which was made from the very outset of planning to train specialists.

However, this highly spectacular progress required a concomitant development of educational facilities (teaching staff, premises, equipment, etc.) and a number of really well-qualified candidates. Much attention was therefore given from the start of the second plan to the quality of the training for specialists and supervisors. For these reasons, a clear drop in university registration appears in the course of the second plan (1933-37) and the total enrolment increase was slow. But the increase in admissions revived during the first years of the third plan (1938-42)[3] and, in 1940, admissions slightly exceeded the level reached in 1932.

The war led to a partial disorganization of educational institutions preparing specialists and halted their development. (See graphs I and II.) However, after 1945, the 1940-level was reached again, both for new admissions and for total enrolment, and the increase in numbers continued during the succeeding years.

By 1949/50, more than 1.1 million students were registered in institutions of higher education and more than 1.3 million in technicums.

The trend in graduations from 1928 to 1950 is shown in graphs 1 and 2 and is summarized in table 1 opposite.

It will be noted that the rate of training of senior specialists increased by six times and that of middle-level specialists by twelve times in the course of the first four five-year plans. It should be pointed out that in the course of the first two five-year plans all the training was provided by full-time education; the so-called 'education without interrupting production' developed beginning with the third plan, but in 1950 the great majority of graduates was still coming from the normal day-time courses (82 per cent for higher education and 89 per cent for technicums).

Table 2 shows the size of the quotas of specialists trained for the Soviet economy during the successive plans. It also shows the size of the

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[1] See p. 118 of the Soviet authors' study.

[2] We shall confine these comments to specialist training properly speaking, leaving aside skilled worker training. (This subject is dealt with in Part Two, chapter 3, of the Soviet authors' study.)

[3] Which was not finished because of the German invasion.

Table 1. Trend in the graduation of specialists from 1928 to 1950 (in thousand)

Year	Higher education		Technicums	
	In absolute figures	In percentage of age groups[a]	In absolute figures	In percentage of age groups[b]
1928	28.7	—	28.6	—
1932	43.2	—	107.7	—
1937	104.8	—	155.9	—
1940	126.1	—	236.8	—
1945	54.6	—	118.1	—
1950	176.9	3	313.7	5.2

a. Estimate as compared with the age group, 22-23

b. Estimate as compared with the age group, 15-20

Table 2. Trend in the total quotas of specialists trained during the first four plans

	Senior specialists	Middle-level specialists	Total
First plan (1928-32)	198 700	319 800	518 500
Second plan (1933-37)	370 000	623 000	993 000
Beginning of the third plan (1938-40)	328 000	678 000	1 006 000
War-time (1941-45)	302 000	540 000	842 000
Fourth plan (1946-50)	652 000	1 278 000	1 930 000

drop in the training of specialists caused by the war: with the fourth plan (1946-50), the USSR only resumed the rate of progress which it should normally have reached as early as the third plan (1938-42).

C. TREND IN THE QUALIFICATIONS OF SPECIALISTS IN THE SOVIET INDUSTRY FROM 1928 TO 1950

It is interesting to compare how in fact during this period from 1928 to 1950 the 'output' of graduates was able to follow the creation of positions which normally require such qualifications.

Unfortunately, with the exception of the years 1933 and 1937,[1] no data are available concerning the trend in the number of positions requiring specialist qualifications during this period, for the economy as a whole.

As regards industry alone, and referring to positions of engineers and technicians,[2] the trend for the number of these positions and the qualifications of the corresponding personnel between 1928 and 1950 is given in table 3.

Table 3. Trend in the number of positions and the qualifications of 'engineers and technicians' in industry between 1928 and 1950

	Number of positions for engineers and technicians	Number of graduates	Number of 'praktiki'	Percentage of 'praktiki'
1928	119 000	38 800	80 200	67.4
1940	1 023 000	311 400	711 600	69.5
Increase	904 000	272 600	631 400	69.8
1928	119 000	38 800	80 200	67.4
1950	1 277 000	393 400	883 600	69.1
Increase	1 158 000	354 600	803 400	69.3
1940	1 023 000	311 400	711 600	69.5
1950	1 277 000	393 400	883 600	69.1
Increase	254 000	82 000	172 000	67.7

Source. Statistical yearbook of the economy of the USSR

During the period 1928-40, characterized by the fulfilment of the first industrialization plans, the number of positions increased rapidly (by nine times); the number of graduates of institutions of higher education and technicums also increased by more than eight times; nevertheless, the proportion of graduates holding 'engineer and technician' positions declined from 32.6 per cent in 1928 to 30.5 per cent in 1940.

In other words, of the 904,000 positions of middle-level and senior specialists created in Soviet industry from 1928 to 1940, nearly 70 per cent were held by the 'praktiki'.

The situation did not improve during the 1940-50 decade. Of course, as a result of the war and the level of industrialization already reached in 1940, the creation of new positions slowed down considerably (only 254,000 new positions in ten years as compared with 904,000 new positions from 1928 to 1940), but, conversely, the rate of training of specialists itself dropped sharply for several years (see table 2), and the war-caused casualties must have considerably increased 'replacement' requirements.

In the final analysis, the percentage (69.1 per cent) of the 'praktiki' holding specialist positions in the Soviet economy in 1950 was practically unchanged as compared with 1940 (69.5 per cent).

It thus appears from table 3 that the rapidity of industrial development, particularly during the first three plans, was so great that the number of middle-level and senior specialist positions in-

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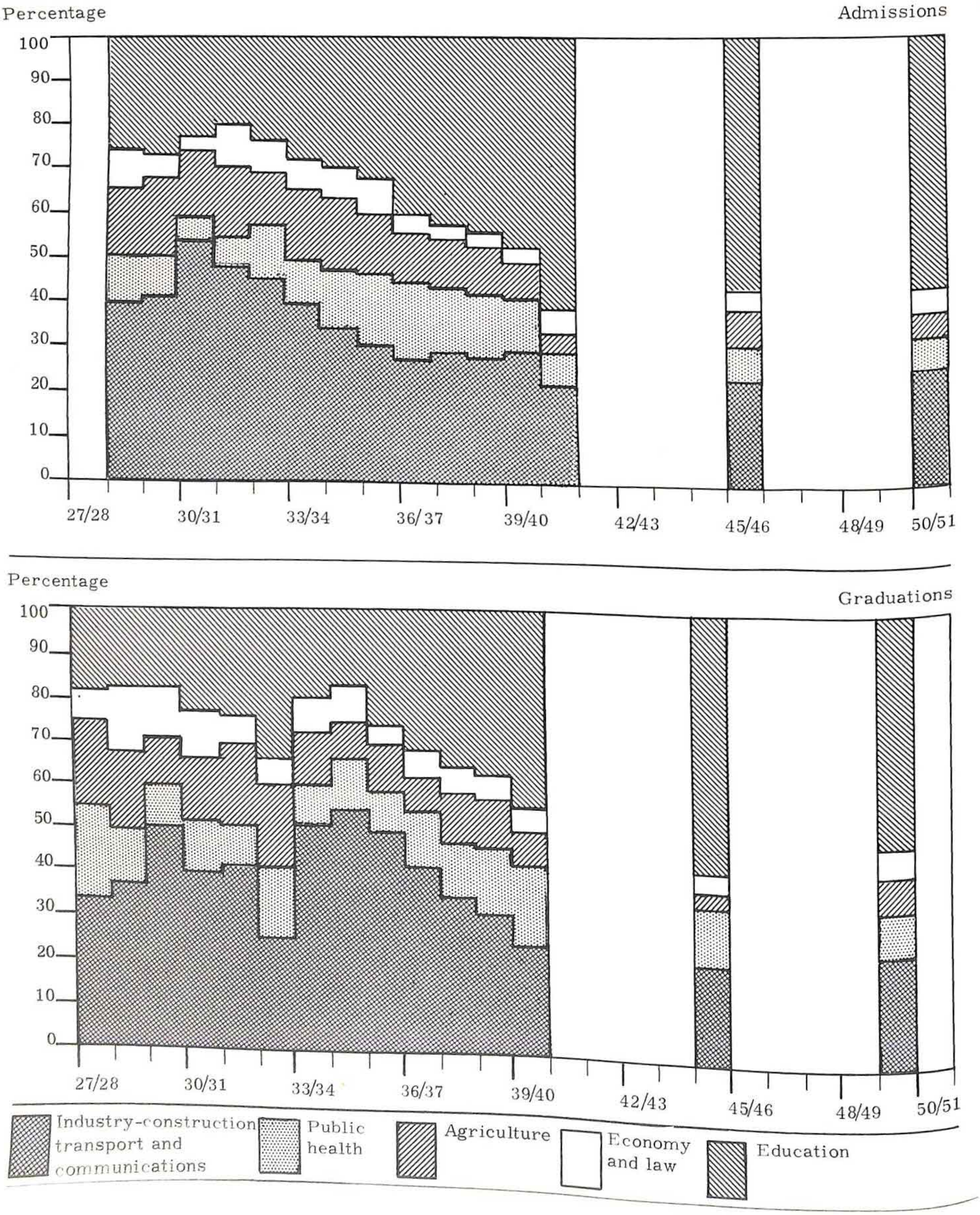
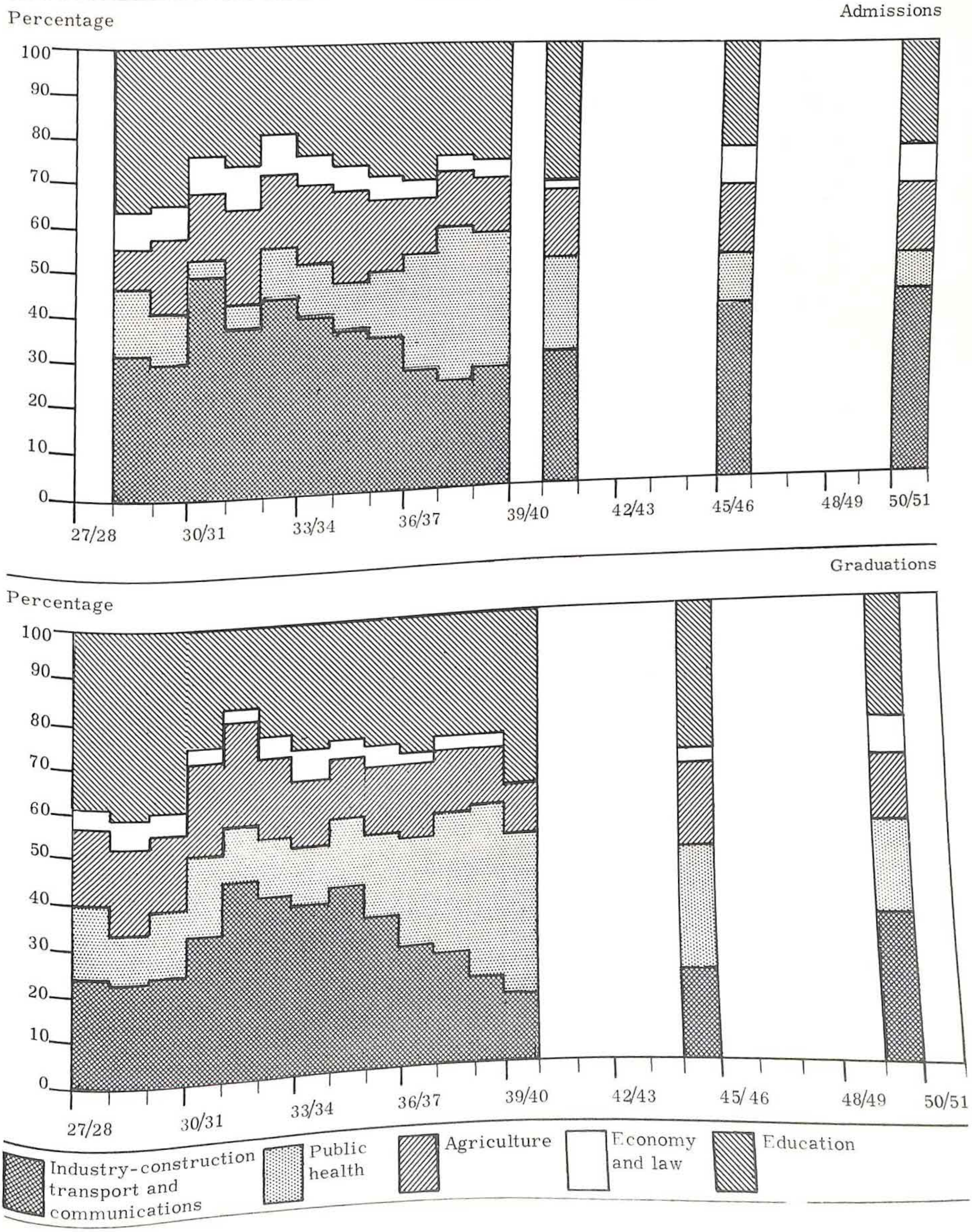
[1] Second five-year plan for the development of the Soviet economy (1933-37). Gosplan, SSSR, pages 624, 632-633.

[2] Since the first plan, these categories of staff, almost in their entirety, must have specialist training, according to the standards of the nomenclatures.

Graph III. Distribution of admissions and graduations of higher educational institution by main areas of specialization, from 1927/28 to 1950/51



Graph IV. Distribution of admissions and graduations of secondary specialized education by main areas of specialization, from 1927/28 to 1950/51



creased much more rapidly, in absolute figures, than the output of graduates of the secondary specialized and higher educational institutions. For this reason, from 1928 to 1940, for example, 711,600 engineer and technician positions out of 904,000 had to be filled by the 'praktiki'. This situation, as we have said, had been understood by the Soviet planners from the outset of the first plan; however, it may appear surprising that this was not understood earlier and that, with a view to subsequent economic development, the exceptional efforts undertaken after 1928 were not started sooner. In fact, because of the underemployment of skilled manpower which characterizes certain sectors of the economy during the period of recovery at the beginning of the 1920s, and because of the lack at that time of any specific development plan, requirements for skilled and highly qualified personnel were not subject to forecasting before the preparation of the first plan. For this reason, L.E. Mints, author of the first study on skilled manpower in the USSR confined himself to writing in 1926: 'The problem of training technical and engineering personnel is not very urgent at present, but this question will assume great importance in the very near future'.[1]

When the first forecasts prepared in connexion with the first plan of industrialization brought out the disproportion between training possibilities (for the reasons which have been set forth above) and the requirements for specialists, the Soviet planners, within the limited means at their disposal, were forced to make choices and to determine priorities in their training plans. It is of the greatest importance to attempt to see what these priorities were.

D. PRIORITIES ADOPTED IN PROGRAMMES FOR SPECIALIST TRAINING FROM 1928 TO 1950

It is not possible within the scope of this report to attempt to study this problem in detail; however, some very general views on the meaning of the basic choices made can be put forward by analysing various categories of indices and statistics. We shall confine ourselves solely to considering changes in the distribution by main areas of specialization of admissions and graduations of institutions training specialists.

Graphs III and IV (p. 266-267) show these data (as a percentage of the total) from 1927/28 to 1950/51 for institutions of higher education and for technicums respectively. Admissions and graduations are classified in five main specializations: industry, construction, transportation and communications; public health; agriculture; economy and law; education[2].

These graphs must be interpreted with caution as guides to the priorities given to the needs of the various sectors of the economy, since the priorities laid down within the training system itself do not automatically reflect the choices made to favour the staffing requirements of a particular branch of activity.

If one attempts to deduce from these two graphs the direction of the 'general policy' followed in specialist training after the first five-year plan, one is led to the following conclusions:

1. A particular effort was made in the allocation of resources to promote the long-term development of the system of public education and of scientific research; this priority given to the preparation of teachers, professors and research workers reveals the awareness of the Soviet planners at that time that industrialization could not really continue to develop in coming decades without the support of well-trained manpower and flourishing scientific research institutions.
2. Particular attention was paid to the welfare of the population, as is evidenced by the relative increase in the training of personnel working in the public health sector.
3. The strong effort accomplished in behalf of the training of technical specialists (industry, construction, transport, and communications) before 1928 and during the first plan did not decline later in absolute figures, but was appreciably reduced from a comparative standpoint during the second and third plans. It was then admitted (as seen in table 3, page 265) that for a certain period part of the additional requirements for specialists would have to be satisfied, at least temporarily, by staff which had not been trained in schools. However, beginning with 1940, the preparation of technical specialists began to assume more importance, particularly at the technician level (26.9 per cent of admissions in 1940, 40 per cent in 1950).
4. As regards the preparation of specialists in agriculture, whose share had remained small during the first plans, an upswing was also to be noted between 1940 (4.5 per cent of admissions) and 1950 (8.2 per cent).

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[1] L.E. Mints. Komandnyi sostav promyshlennosti, transporta i sel'skogo khoziaistva v SSSR, p. 29, Moscow, 1926.

[2] This heading covers graduations of the higher pedagogical institutes, university graduations in the physical and natural sciences and a small percentage of graduations in the arts ('art and cinema').

Section III DEVELOPMENT OF THE POLICY FOR SPECIALIST TRAINING SINCE 1950. RESULTS AND FUTURE PROSPECTS

With the beginning of the decade of the 1950s, the post-war period of recovery was coming to an end; the new and ambitious targets for economic growth which were to be set in the fifth, sixth and seventh plans led at that time to intensified requirements for specialists as compared with the previous decade.

A. CHANGES IN THE RATE OF SPECIALIST TRAINING IN THE COURSE OF THE FIFTH, SIXTH AND SEVENTH PLANS

The specialist-training institutions, partly disorganized during the war, were restored during the fourth plan and, beginning in 1950, the rate of preparing middle-level and senior specialists was very clearly higher than the level reached in 1940. (See graphs I and II, p. 262-263, and table 1, p. 265.)

Graphs V and VI show the respective trends of admissions and graduations in institutions of higher and secondary specialized education during the fifth, sixth and seventh plans, i.e., for the period 1950-65.

1. Five-year period - 1951-55

During this period, the number of admissions to institutions of higher education was to increase by nearly 32 per cent and to technicums by 38 per cent; however, the proportion of students admitted to courses 'without interrupting production' increased considerably at that time.[1] At the same time, the number of graduates was to increase from 177,000 to 246,000 for institutions of higher education (including 27 per cent trained 'without interrupting production'), and from 314,000 to 388,000 for the technicums (including 11 per cent trained 'without interrupting production').

As a result, the authors of the Soviet study note that in the course of the fifth five-year plan, the level reached by the planned development of higher and secondary specialized education made it possible to satisfy the essential requirements of the national economy and of culture.[2]

2. Five-year period - 1956-60

This period (which originally constituted the sixth plan) is characterized by a halt in the progress of admissions, even by a slight decrease during 1956, 1957, and 1958; progress is resumed only after 1959/60.[3]

This 'breathing spell' in the expansion of the educational system is no doubt to be explained by the following two essential reasons:

The desire which recurs periodically in the history of Soviet higher and secondary specialized education to give priority to qualitative improvement rather than quantitative development.

Taking into consideration the relatively high degree to which requirements for specialists were satisfied by 1955, the desire to limit the increase of expenditure in this area in favour, perhaps, of other types of expenditure, such as those for scientific research; in other words, the training of scientific specialists having been carried to a relatively high level in 1955 (see table 9 of the Soviet authors' study), priority is given for the time being to the development of operating facilities for institutions of scientific research.[4]

In spite of this stabilization of total admissions, the proportion of part-time students (evening and correspondence courses) continues to increase rapidly as compared with 1955; in 1960, it reaches 52 per cent in higher education and 47 per cent in the technicums.

It will be noted, moreover, that from 1951 to 1959 the number of graduates of the complete secondary school was multiplied by four (400,000 in 1951; 1.6 million in 1959) as a result of the policy of expanding admission to grades 9 and 10 (resolution of the nineteenth congress of the CPSU concerning the introduction of compulsory ten-year schooling in urban areas); consequently, the number of candidates and hence the level of selection for admission to university studies increased considerably; the surplus of secondary-school graduates as compared with the possibilities of

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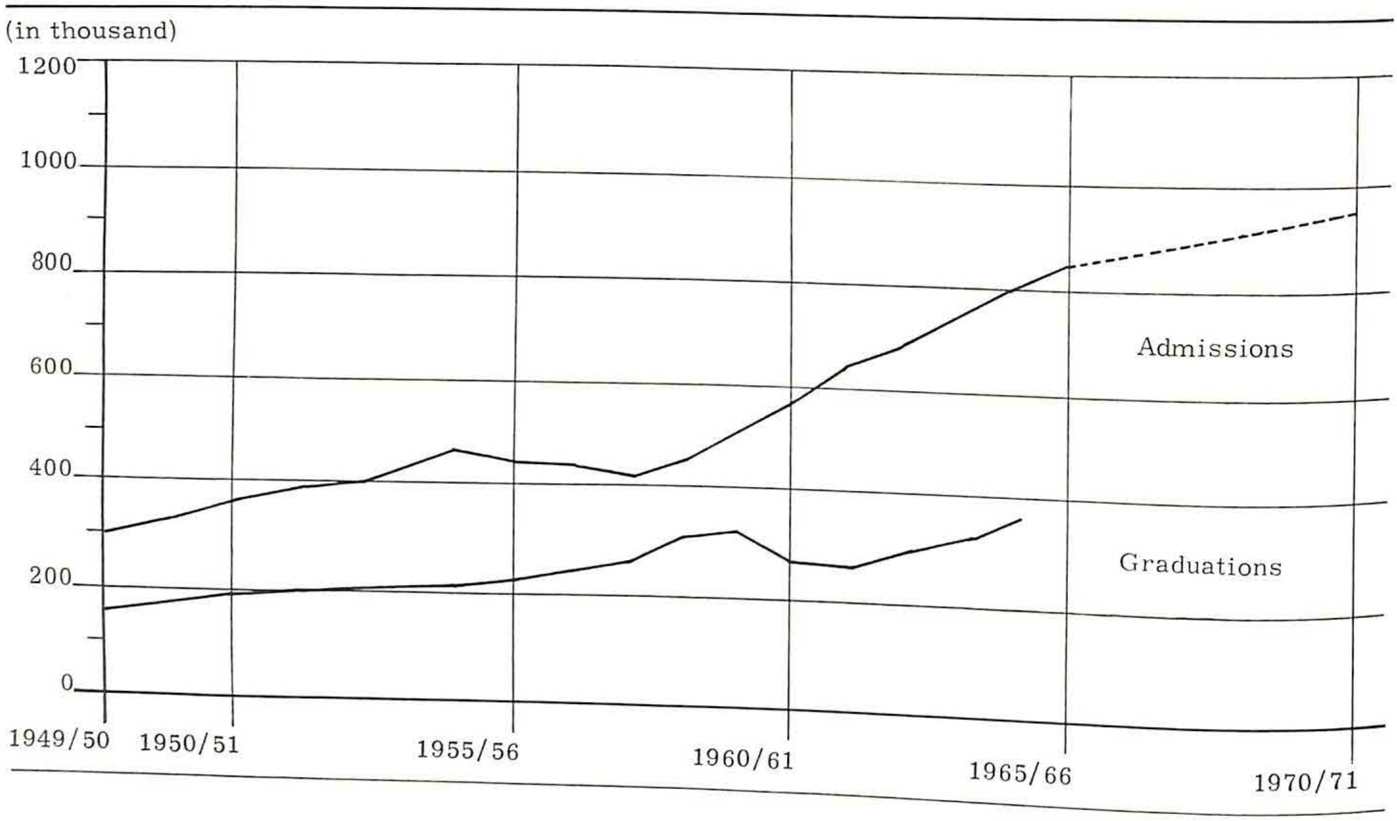
[1] See table 45 of the Soviet authors' study from 1950 to 1955, the percentage of admissions to evening or correspondence courses increased from 34.6 to 44.3 per cent for higher education and from 18 to 27.8 per cent for the technicums.

[2] See p. 138 of the Soviet authors' study.

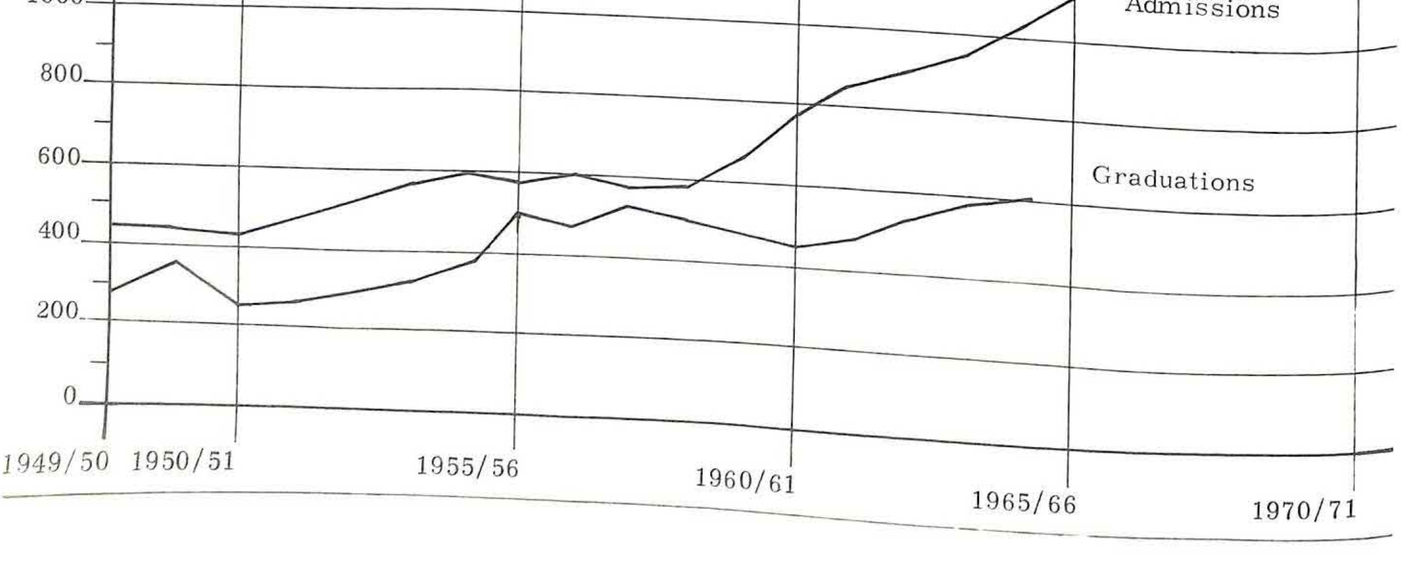
[3] For normal day-time education, the 1955 admission rate will be reached only in 1960 or 1961 (See table 45 of the Soviet study.)

[4] Expenditures for specialist training increased slightly from 1955 to 1960 (2,402 million roubles in 1960 against 2,326 million in 1955), whereas the budget for scientific research was almost trebled during the same period (2,314 million roubles in 1960 against 825 million in 1955).

Graph V. Number of admissions and graduations of higher educational institutions, from 1949/50 to 1970/71



Graph VI. Number of admissions and graduations of secondary specialized institutions, from 1949/50 to 1970/71



admittance to higher educational institutions[1] and the need for an increasing number of them to go to work directly after completing grade 10 are the essential factors which have led the Soviet authorities to transform the nature of the complete secondary school (law of 21 December 1958) and to emphasize its 'polytechnical' nature.[2]

3. Five-year period - 1961-65

During this seventh plan, the rate of admissions to institutions preparing specialists increases again (see table 45 of the Soviet authors' study) both in higher education (820,000 admissions in 1964 against 593,000 in 1960) and in the technicums (1,038,000 admissions in 1964 against 769,000 in 1960). However, the share of education 'without interrupting production' tends to increase further but at a slower rate than previously (57 per cent of admissions to higher education and 49 per cent in the technicums in 1964 against, respectively, 56 and 46 per cent in 1960).

With respect to graduates, the total numbers of specialists prepared by educational institutions and made available to the Soviet economy during the three plans under consideration are as shown in table 4.

Table 4. Total numbers of specialists trained during the fifth, sixth and seventh plans

	Senior specialists	Middle-level specialists	Total
Fifth plan (1951-55)	1 121 000	560 000	2 681 000
Sixth plan (1956-60)	1 497 300	2 576 700	4 074 000
Seventh plan (1961-65)	1 773 000	2 570 000	4 343 000

The regular increase in the number of specialists prepared in the course of the fifth and sixth plans is followed by a relative stabilization from 1961 to 1965 (see graphs V and VI), which is related to the stabilization of admissions in the course of the sixth plan. On the other hand, the resumption of the growth in admissions during the seventh plan (see above) makes it possible to foresee a new increase in the number of specialists during the eighth plan (1966-70).

B. NEW POLICIES ADOPTED IN SPECIALIST TRAINING PROGRAMMES SINCE 1950

The major directions of effort applied to the specialist training programmes in the course of the successive five-year plans over the period 1928-50 have been discussed in section II.

Beginning with the fifth plan (1951-56), the trend of priorities which had already begun to some extent under the preceding plan was more strongly stressed. An analysis of tables 33 and 34 in the Soviet authors' study (showing numbers of students admitted to specialist-training institutions by field of specialization in absolute figures and as percentages of the total) brings out the characteristics of the changing lines of effort from 1950 to 1964/65.

1. Higher educational level

1. The 'Education'[3] sector continues to increase in absolute figures (269,200 admissions in 1964 against 182,600 in 1950) since the expansion of the secondary grades and of institutions for scientific research requires further additional human resources; however, its relative share drops sharply from 52.3 to 32.8 per cent of the total. At the same time, the training of young research workers ('aspirantura') in the universities and institutes of the Academy of Sciences increases regularly from plan to plan. (See table 9 of the Soviet authors' study.)
2. The 'Industry-construction' and 'Communications' sectors quadruple the number of their new students from 1950 to 1964 and their relative share in total admissions grows from 24.6 per cent in 1950 to 43.5 per cent in 1964.
3. The training of senior specialists in agriculture continues until 1963 the increase noted in the fourth plan both in absolute figures and in percentage of the total (11.2 per cent in 1963 against 8.2 per cent in 1950).
4. The sectors of 'Economy and law' and 'Public health' double their admissions in absolute figures but show a slight relative decrease.

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[1] However, because of the drop in the birth-rate during the war, the number of graduates of the ten-year school fell considerably between 1959 and 1964; it returned to the 1958 level in 1965 and for some time in 1966 almost doubled (2.6 million graduates) because of the fact that two classes were graduating from the complete secondary school at the same time (the last eleventh grade of the 1958 reform and the first tenth grade of the 1964 reform).

[2] See chapter 2 of this report.

[3] The heading 'Education' in table 33 of the Soviet authors' study.

2. Secondary specialized educational level[1]

1. Admissions to 'pedagogical technicums' dropped in relative terms until 1964, remaining stable in absolute figures.[2]
2. The training of technicians for industry, construction and communications increased nearly 200 per cent in absolute figures and from 40 per cent of total admissions in 1950 to 48.5 per cent in 1964.
3. The training of technicians in agriculture progresses at the same rate as for industry (13.9 per cent of the total in 1950, 16.6 per cent in 1964).
4. For the other sectors, only economics and law clearly improve their relative share (12.8 per cent in 1964 against 8.2 per cent in 1950).

To sum up, the special importance attributed in the course of the second, third and fourth plans to teacher and specialist training in the pure sciences yielded its results in the course of subsequent plans.

On the one hand, institutions for scientific research experienced considerable expansion. (We shall not dwell on this subject in the present study.)

On the other hand, institutions training specialists for the various sectors of the national economy were constantly better provided with teachers and well-qualified students so that they too, in their turn, were able to expand rapidly in order better to satisfy the requirements of the Soviet economy for specialists. It is useful to see how these efforts have affected the level of qualification of middle-level and senior Soviet specialists since 1950.

C. TRENDS IN THE QUALIFICATIONS OF SPECIALISTS IN THE SOVIET ECONOMY SINCE 1950. GRADUAL REDUCTION OF THE PERCENTAGE OF 'PRAKTIKI'

Unlike the situation noted during the preceding decade, the rate of specialist training had already become so high that the additional specialist positions could, to an ever larger extent, be held by graduates. A study of the Soviet statistics concerning the qualifications of specialists in industry brings out the importance of this reversal in the trend beginning with 1950.

1. Trend in the qualifications of specialists in industry from 1950 to 1964

Table 5 shows the trend in the qualifications of the 'engineer and technician' categories from 1950 to 1965, with breakdown for the periods 1950-54, 1954-60 and 1960-65.

Table 5. Trend in the number of positions and the qualifications of 'engineers and technicians' in industry between 1950 and 1965

	Number of engineer and technician positions	Number of graduates	Number of 'praktiki'	Percentage of 'praktiki'
1950	1 277 000	393 400	883 600	69.1
1954	1 530 000	629 000	901 000	58.9
Increase	253 000	235 600	17 400	6.8
1954	1 530 000	629 000	901 000	58.9
1960	2 008 000	1 667 500	340 500	17.0
Increase or decrease	478 000	1 038 500	−560 500	
1960	2 008 000	1 667 500	340 500	17.0
1965	2 860 000	2 524 900	335 100	11.0
Increase or decrease	852 000	857 400	−5 400	

Source. Statistical yearbook of the economy of the USSR, 1965

From 1950 to 1954, the new positions (338,000) were filled by calling upon only a low proportion (6.8 per cent) of 'praktiki' or non-graduates. In other words, the number of 'praktiki' reached its maximum in 1954, and after that date, the rate of 'output' of graduates became so high that not only could new positions be completely filled by graduates but, in addition, the 'praktiki' were gradually replaced by personnel with the training theoretically required;[3] for this reason, the number of 'praktiki' dropped rapidly in absolute figures (901,000 in 1954, 340,500 in 1960 and 335,100 in 1965) and they occupied only 11 per cent of the total number of positions in 1965.

In other words, it now appears that the days of the 'praktiki' holding specialist positions in Soviet industry are numbered; their complete elimination depends only on the retirement age of those who are too old to obtain the theoretical qualifications corresponding to the positions they hold.

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[1] The proportion between the number of specialists with higher education and those with secondary specialized education is one of the key-indices used by Soviet planners. We shall not take up this problem here and remind readers that it is considered in particular on p.120-121 and p.140-141 of the Soviet study, as well as in table 42.

[2] Requirements for graduates of 'pedagogical technicums' will increase again, especially because of the rapid development of kindergartens.

[3] The replacement of 'praktiki' by graduates takes place in two ways: on the one hand, replacement pure and simple when the individual's activities come to an end (retirement, death, etc.); on the other, 'praktiki' may obtain the theoretical qualification required owing to training 'without interrupting production'.

This rapid transformation of the level of qualification of specialists in Soviet industry is to a large extent the result of the new priority given to this area of training since the fifth plan, as was said earlier. This result is reflected in graph VII.

2. Trend in numbers of the working population and percentage of specialists by branch of activity, from 1940 to 1963

Table 42 of the Soviet authors' study shows simultaneously the trend in the over-all number of workers in the Soviet economy by branch of activity and the trend in the percentage of graduate specialists used in each branch for the years 1940, 1960 and 1963.

For the economy as a whole, the percentages of these specialist and supervisory personnel appear as in table 6.

Table 6. Trend in percentage of specialists employed in the national economy from 1940 to 1963

	Senior specialists(a)	Medium-level specialists(b)	Total
	%	%	%
1940	1.46	2.4	3.86
1960	4.1	6.0	10.10
1963	4.7	6.8	11.5

a. Specialists having completed higher education
b. Specialists having completed secondary specialized education

These percentages illustrate the great progress accomplished between the years 1940 and 1963 in staffing the Soviet economy with officially trained specialists, in spite of the difficulties created by the war.

Table 42 of the Soviet authors' study also shows the sectors which, owing to their backwardness as of 1940, gave proof of the most rapid progress between that year and 1963: agriculture (a growth of 13.7 times in absolute value), commerce (growth of nineteen times in absolute figures), etc.

The results confirm what we have previously mentioned in regard to the choice of priorities since the inception of the fourth plan and the importance of the general acceleration of the rhythm of training output of medium-level and senior specialists.

D. FUTURE PROSPECTS OF THE SYSTEM OF PRODUCING SPECIALISTS FOR THE SOVIET ECONOMY AND THE OVER-ALL TREND IN QUALIFICATIONS OF THE WORKING POPULATION

What has been said above emphasizes the considerable progress in the qualifications of specialists achieved since 1950 both in industry and the economy as a whole. However, the replacement of 'praktiki' by graduates has not been completed in all sectors and, in any event, the growth targets of the eighth plan (1966-70) and the long-term prospects of the Soviet economy laid down for 1980 make it necessary to raise specialist training to an even higher level.

1. Specialist training targets in the eighth plan

Graphs V and VI show the targets of the eighth plan (1966-70) with respect to admissions to institutions of higher education (940,000 admissions in 1970, or about 20 per cent of the 17-18 age group) and to the technicums (1.6 million, or about 35 per cent of the corresponding age groups).[1] In the course of the eighth plan, 7 million graduate specialists, 65 per cent more than during the previous five years, will become economically active. A number of these graduates will therefore replace the 'praktiki', and the growth in the rate of graduates will accelerate for all branches in general of the USSR economy.

This trend will be strengthened during the ninth and tenth Soviet plans if one may judge by the forecasts for specialist education included in the 1980 CPSU programme.[2]

2. Prospects for 1980 of qualifications of the Soviet working population

The data of the Soviet censuses of 1939 and 1959 (table 7) show the extent of the progress achieved in the qualifications of the working masses, but also show the after-effects which still subsisted in 1959, particularly in the case of manual workers, of the low average schooling of youth before the first five-year plan.

According to the data for 1939, almost all manual workers (labourers, workers, collective farmers) had not completed the seven-year school, i.e., most of them had at best completed the four-

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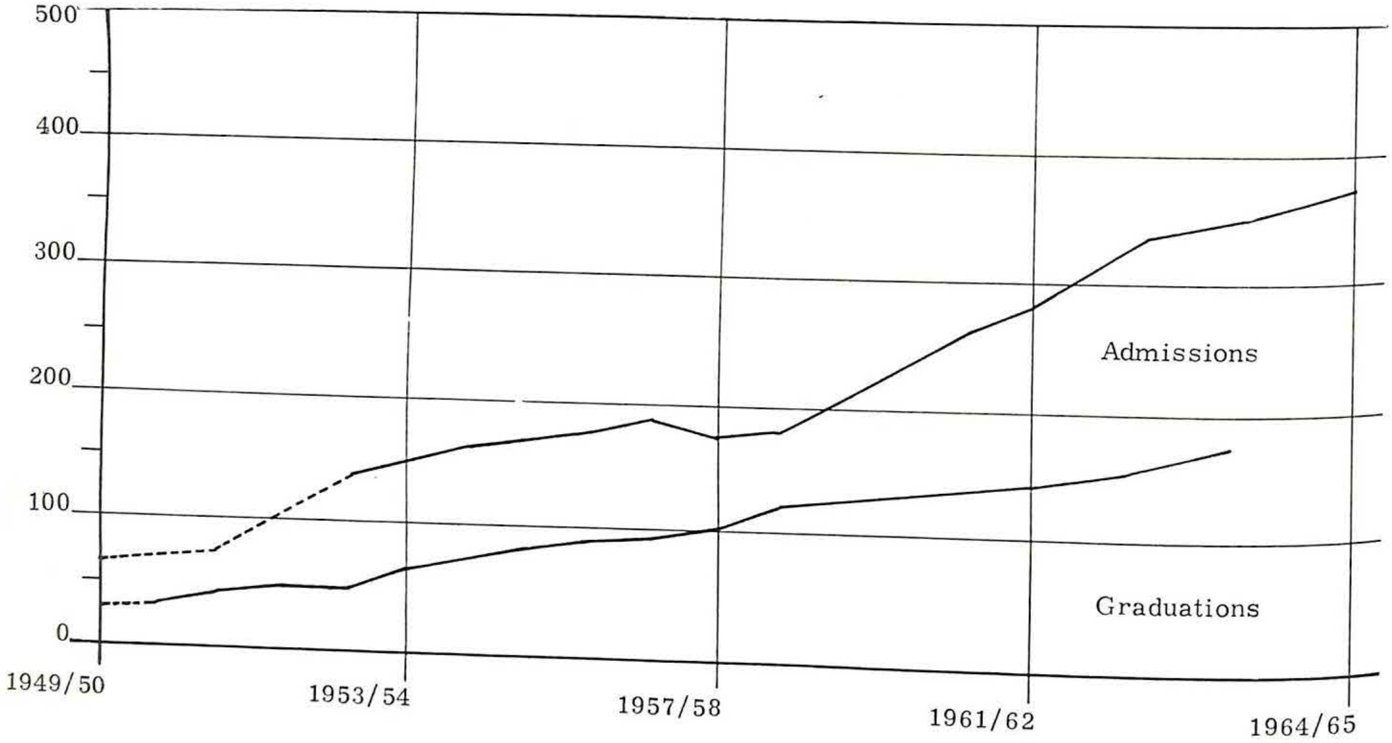
[1] In 1966, 900,000 new students were admitted to higher education and 1.2 million to technicums.

[2] See p.176 of the Soviet authors' study.

Graph VII. Preparation of engineers and technicians, from 1949/50 to 1964/65

a) Engineers (in thousand)



b) Technicians (in thousand)

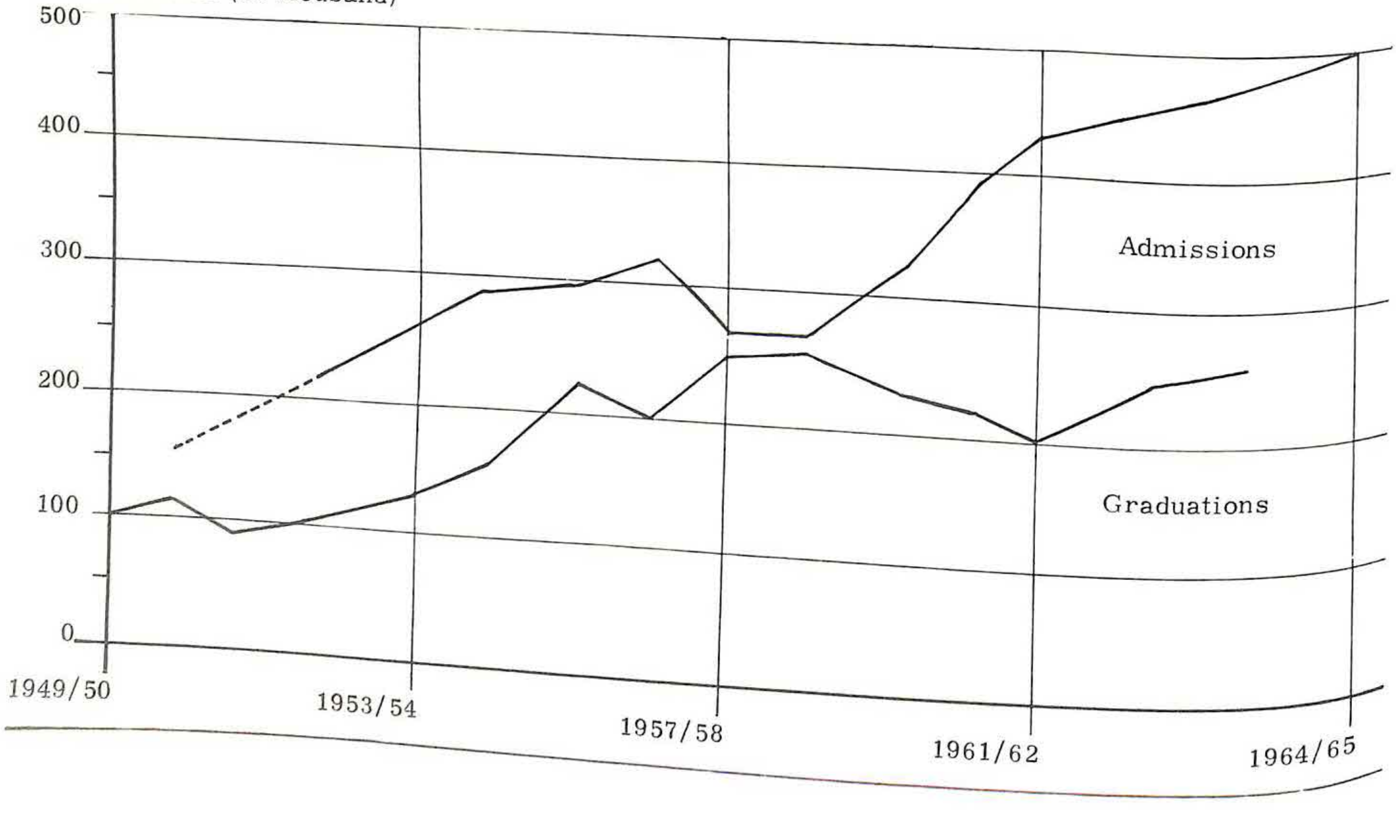


Table 7. Comparison of the qualifications of the Soviet working population by main vocational groups in 1939 and 1959 (in percentage of total number of each group)

Vocational categories	Less than seven years of schooling[a]		Seven years of schooling or more[b]	
	1939	1959	1939	1959
	%	%	%	%
Labourers	95.7	68.4	4.3	31.6
Workers	91.8	61.4	8.2	38.6
Collective farmers	98.2	77.4	1.8	22.6
Office employees	48.1	10.7	51.9	89.3
Managerial workers	50.2	11.6	49.8	88.4
General average	87.7	56.7	12.3	43.3

a. Persons who did not complete seven-year schooling
b. Persons having completed seven-year schooling or having gone beyond (ten-year school, vocational schools, technicums, university)

Table 8. Trend in graduations of specialists from higher and secondary specialized education from 1950 to 1980 (in percentage of age groups)

Year	Higher education	Secondary specialized education
	%	%
1950	3	5.2
1963	8	13 to 14
1970	12 to 13	19 to 20
1980 ([a])	19 to 20	28 to 30

a. These percentages result from the prospects shown for higher education on page 176 of the Soviet authors' study (one million to 1.1 million graduates in 1980), and assume that the proportion between middle-level and senior specialists remains as set for admissions in 1970

year elementary school. In 1959 the percentage of manual workers who had completed the seven-year school had increased considerably.

This structure of the qualifications of the active population in 1959 will be radically changed by 1980 as a result of the measures adopted by the Soviet authorities to develop the educational system, particularly since the end of the Second World War.

In 1980, the oldest workers will have attended at least the eight-year school[1] but the great majority of the working population, particularly in the 29-40 age group, will have continued their education well beyond.

As has been said (see chapter 2), beginning in 1970 all youth will attend the ten-year school or receive a general education of equivalent level. Moreover, according to the targets of the eighth plan, in 1970, of a generation of Soviet youth, (a) 1.7 or 1.8 million (approximately 37 to 38 per cent of the corresponding age groups) will be admitted to vocational and technical schools: (b) 1.6 million (approximately 35 per cent of their age group) will be admitted to the technicums; (c) 0.94 million (20 per cent of the average of the 17 to 20 year age group) will be admitted to higher educational institutions.[2]

This means that almost four-fifths of these groups of Soviet youth will have received, in addition to general education, training either as skilled workers or middle-level and senior specialists (including, of course, training 'without interrupting production').

If we consider only the training of middle-level and senior specialists, the percentage of graduates as compared with each age group should be, from 1950 to 1980, as indicated in table 8.

It is all of these prospects taken together which allow the authors of the Soviet study to affirm that in 1980 one Soviet worker out of five (20 per cent) will be a graduate of an institution of higher or secondary specialized education while the rest of the working population will have received secondary general education and extensive vocational training.

However, this percentage of 20 will then constitute the average between the graduates of 1950 (8.2 per cent) and those of 1980 (45 to 50 per cent), i.e., if the rate of training middle-level and senior specialists reached in 1980 were simply to continue at this level, towards the year 2000, the Soviet working population would include almost 40 per cent of graduate specialists,[3] or twice as many as in 1980.

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[1] At present, young adults who have not completed eight-year schooling are required to do so in evening school.

[2] These percentages do not add up altogether since, in particular, some of the graduates of the technicums may go on to higher studies.

[3] Average between the graduations of 1970 and those of the year 2000.

Conclusion

AN APPRAISAL OF THE SOVIET EXPERIENCE IN FORECASTING MANPOWER REQUIREMENTS

The content of sections II and III of this chapter illustrates the outstanding progress accomplished in the USSR since the first five-year plan in training manpower, and particularly in training middle-level and senior specialists: 518,500 specialists were trained in the years 1928-32 (first plan); more than 7 million will be trained between 1966 and 1970 (eighth plan).

As has been explained in the first section, plans for specialist training are normally based on estimates of manpower requirements. However, we have seen that during the first four plans the requirements for specialists were higher than the possibilities of output of educational institutions and that it was necessary to rely upon on-the-job training.[1]

However, with the end of the fifth plan (1950-55), at a time when the output of young specialists began to correspond more or less to the increased overall requirements, the conditions for the application of methods of forecasting were changed. Since that time, many Soviet specialists have stressed the methodological difficulties inherent in this type of forecasting.[2] As a matter of fact, near the end of the fifth plan, a relative surplus was noted in some disciplines and, conversely, a shortage in other specialities, and as of 1954 the Soviet government found it necessary to adopt measures for the improvement of forecasting techniques.

To a certain extent, it can be said that the discrepancies found at that time can be explained by the previously mentioned 'inertia' of the educational system and by the difficulty encountered at a time of rapidly changing requirements in certain specialities - upwards or downwards - in immediately expanding or reducing numbers of admissions to the corresponding secondary or higher schools. It is clear that even if it were possible to obtain accurate information on medium- and long-term requirements for specialists in the various categories, the complete satisfaction of these requirements - i.e., the transposition of recruiting plans into training plans - would always involve in practice specific difficulties of an administrative, technical, pedagogical and financial nature which should not be underestimated.

But, in fact, the major difficulty remains the preparation of recruiting plans[3] - particularly the forecasting of additional medium- and long-term requirements - much more than the preparation of the training plans which follow therefrom.

We have summarized (section I) the features of the two main methods used simultaneously by the Soviet planners, particularly in forecasting the specialist requirements of the industrial sector.

The combination of both methods (estimate of short-term requirements by the so-called 'nomenclature' method and of long-term requirements by the so-called 'saturation rate' method) constitutes, in theory, a logical solution to the problem posed:

1. The long-term (ten years or more) forecasts prepared by the saturation rate method make it possible to determine numbers of admissions for each year of the plan and to provide the corresponding additional facilities (premises, teachers, appropriations, etc.).
2. The yearly inventory of the requirements of enterprises or departments constitutes the basic instrument for the placement of graduating specialists; even more, the estimate of the requirements of enterprises for the entire period of the plan may itself contribute to estimating admissions during the first or second year of the plan (for short-term training) and allows a verification of the 'saturation rate' method for the final year of the plan.

As a rule, therefore, this methodology solves all the problems which arise (plans of admission to the schools, plans of placement in the enterprises) and is theoretically satisfactory for the mind. In fact, however, its application involves complicated problems, for reasons which are due essentially to current conditions of the changing trends in methods and techniques of production.

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[1] From this point of view, one may perhaps be just as much impressed by what the leaders of the Soviet economy were able to achieve *without* formal education as by the results which they obtained *thanks* to education.

[2] I.A. Liasnikov, *Podgotovka spetsialistov promyshlennosti SSSR*, Moscow, 1954.
G.S. Anodin, *Opredelenie potrebnosti v spetsialistakh v promyshlennosti*, Moscow, 1959.
NIEI Gosplana SSSR, *Planirovanie potrebnosti narodnogo khoziaistva*, Moscow, 1959.
L.A. Komarov, *Planirovanie podgotovki i raspredeleniia spetsialistov v SSSR*, Moscow, 1961.
V.E. Komarov, *Ekonomicheskie osnovy podgotovki spetsialistov glia narodnogo khoziaistva*, Moscow, 1959.
M. Sonin, *Podgotovka i povyshenie kvalifikatsii rabochikh na proizvodstve*, Moscow, 1951.
N.N. Zabelin, *Narodnokhoziaistvennoe znachenie gosudarstvennykh trudovykh rezervov*, Moscow, 1959.
N.N. Zabelin, G.N. Zelenskii, F.I. Kotov and V.T. Roshchin, *Planirovanie podgotovki i raspredeleniia rabochikh kadrov v SSSR*, Moscow, 1960.

[3] The total obtained by adding the increase in the number of specialists and the replacements during the period under consideration.

The 'nomenclature' method

This so-called 'nomenclature' method is based, as has been said, on annual and five-yearly surveys carried out in enterprises, regions or industrial branches.

The authors of the Soviet study, explaining the detailed use of this method, do not hide the fact that it is particularly difficult to estimate the requirements for specialists which result from an increase in the number of positions.[1]

Indeed, even if one assumes that factories or industrial regions have available in good time all the necessary information on the development of their production during the five-year period and on the size and nature of their investments, etc., they still need to evaluate the effects of changes in techniques and materials of production, as well as of all other factors[2] on their requirements for specialists. Each factory, region or branch of industry must therefore study its own problems. The tendency is obviously for each sector to base itself on the staffing pattern of the foremost factories or organizations of the same category, when these factories or organizations already exist.[3]

It is, of course, a tremendous advantage for the Soviet manpower planners to have available to them regular and standardized information coming directly from the factories themselves (or from the bodies supervising them) tied to the production targets of the plan; but the systematic reference (when it is possible) to 'pilot factories' - however important it may be - clearly reveals the complexity of defining 'standard staffing patterns'[4] for all sectors on a truly scientific basis. By the very nature of things, it is therefore necessary to utilize the best possible approximations.

The 'saturation rate' method

Other hazards in forecasting are involved in the so-called 'saturation rate' method, i.e., long-term forecasts[5] (a minimum of one decade in advance). As has been said, it is thanks to this method that admissions plans can be determined for the whole of the plan period and the corresponding resources allocated.

This type of forecasting is subject to two major uncertainties:

One is the difficulty already mentioned of foreseeing the effects of changes in techniques on the staffing pattern for different branches of economic activity. The difficulties already existing within the period of fulfilment of the plan are further amplified if the point of reference is shifted to even more remote economic prospects.

The other major uncertainty concerns the long-term forecasting of the distribution of the working population among the various branches of activity.

To foresee the trend in 'staffing patterns' in a branch of activity is one thing, but to foresee the long-term development of the production of this branch of activity is quite another.

Within the limits of the five-year plan, the forecasting of production by branch obviously is generally satisfactory and, for this reason, permits sound forecasting of the distribution of manpower according to the methods explained in Part Two, chapter 1, of the Soviet authors' study. But, when one goes beyond the limits of the five-year plan, what production forecasts can be taken as a basis?

According to the terms used by the Soviet authors, long-term manpower forecasts are also based on the development plans of the various branches of the national economy.[6] (The programme adopted by the twenty-second congress of the CPSU in 1961 laid down 'economic expansion targets' for 1980.)

Whatever the effort of methodological reflexion undertaken to imagine the structure of the Soviet economy at that date, it is obvious that the '1980 targets' can have neither the accuracy nor the forecasting value of those included in short-term plans.[7] Consequently, the uncertainties which any industrialized economy - in which techniques are changing constantly - must have with respect to its future production targets seriously affect the value of the forecasts of the distribution of manpower by branch of activity (at least for the production of material goods) and hence of the long-term requirements for middle-level and senior specialists in the various branches.

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1. See p. 141 of the Soviet authors' study.
2. See p. 141 and following of the Soviet authors' study.
3. See p. 141 of the Soviet authors' study.
4. Proportion of middle-level and senior specialists as compared with the total number of workers in the various branches of activity and by specialities.
5. These forecasts have been prepared in the USSR for the year 1980. (See p. 146 of the Soviet study.)
6. See p. 145 of the Soviet authors' study.
7. For example, the target of 250 million tons of steel annually by 1980 may have to be reconsidered because of the production of new materials which will result from the progress of the chemical industry.

The difficulties encountered

It will be noted, moreover, that the 'nomenclature' method and the 'saturation rate' method do not fully supplement each other.

As has been pointed out,[1] the 'saturation rate' method does not claim to determine high- and medium-level specialists ten years in advance for each speciality, but only for groups of specialities. This type of forecast suffices for a calculation of the number of admissions and resources (human, material, financial) which will be required for each year of the five-year plan.

It is still necessary to come to a decision, year by year, for the plan in current operation, as to the number of students to be admitted to each speciality,[2] and if the requirements cannot be accurately forecast by specialities for the immediately succeeding years by the 'nomenclature' method in the first year (or the first years, in so far as admittances to training courses of shorter duration are concerned) of a plan (for example in 1966 up to 1970 in the eighth plan), it will be necessary to resort to other methods. The Soviet planners then adopt the procedure of dividing up into specialities the numbers obtained by speciality groups based on the specialization structure of engineers and technicians 'in the most modern enterprises'.

The Soviet authorities, of course, are well aware of the difficulty of the problems to be solved, but they feel, nevertheless, that the results which they have obtained have established, generally speaking, a satisfactory basis on which to work out their programmes for the training of specialists.

If, at the conclusion of this chapter, we have laid special emphasis on methodological problems, our intention was to convey to planners of other countries the fact that Soviet methodology does not claim to be a simple mechanism which can infallibly solve all the problems of adjusting specialist training to the fluctuating requirements of a constantly changing economy but, on the contrary, an extremely complex undertaking calling for the constant improvement of methods. One may, moreover, foresee that in the field of specialist education, as in that of skilled manpower training (see Part Two, chapter 3 of the Soviet authors' study and, particularly, the information on training with 'a broad range'), the solution will have to be sought increasingly in even more flexible types of 'many-sided' training which will reduce the economic and human consequences of the inevitable margin of error in medium- and long-term forecasts. In other words, not only will the training given have to be adapted to the positions, but the specialists trained will have to be adaptable to various types of positions.

In the final analysis, in spite of the inevitable complexity and the difficulties of implementation of the methods adopted in the Soviet Union for the long-term forecasting of specialist requirements, these methods should not be underestimated nor should they be considered discouraging by countries desiring to undertake an efficient planning system for the vocational and technical education and training, at all levels, of their youth.

The enormous merit of the Soviet planning system, from the methodological and practical point of view, is to have clearly envisaged, as far back as 1928, the problem of providing skilled and highly qualified manpower for all sectors of economic and cultural activity and to have made unceasing progress in the search for the most rational solutions. A policy of that character requires a sustained effort of administrative organization, both on the part of the services concerned with problems of human resources and on the part of the ministerial departments responsible for education. This organizational effort can then find its full effectiveness only within the scope of those educational fields which are essential for the preparation and implementation of a national plan of economic and social development.

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[1] See p. 146 of the Soviet authors' study.

[2] Subject to the possibilities which may be offered by some institutions of higher education of making a final choice of speciality only at the end of the second year.

Chapter 4

Economic and financial aspects of education in the USSR

Chapter 5 of Part Two of the Soviet authors' study deals with the procedures and the financing scale of Soviet education. This final chapter of the mission report is devoted to observations suggested by the Soviet text and also to direct findings of the mission members during their visits. This chapter also summarizes the information which they gathered concerning the studies and research conducted by Soviet specialists in the field of the economic aspects of education.

Section I

EXPENDITURE FOR EDUCATION AND METHOD OF FINANCING

A. SINGLE STATE BUDGET OF THE USSR, THE ESSENTIAL SOURCE OF FINANCING FOR EDUCATIONAL SYSTEMS

1. Table 50 of the Soviet authors' study shows the amount of educational expenditure financed from the single state budget of the USSR: 93.3 per cent of the total expenditure in 1960, and 92.8 per cent in 1964.

As shown by the same table, the other sources of financing are constituted by: (a) the share of the families in the care of their children - food, clothing, etc. - in day nurseries, kindergartens, boarding schools, etc., amounting to 4.7 per cent of the total in 1960 and 5.9 per cent in 1964;[1] (b) the shares paid by various types of organizations - social security, trade unions (0.1 per cent in 1964)[2] and economic agencies (0.2 per cent in 1964.)[3]

2. Table 50 does not show, actually, all the expenditures made for education in the USSR. In order to be complete, it would have to take into account also certain other expenditures for education made by the families (purchase of school supplies, private lessons, etc.), the resources of the schools themselves, a part of which is applied directly to advancing the cause of education, and other expenditures directly financed from the budgets of factories or farms.

The resources of the schools themselves are derived from various sources:

Sale of products from school gardens. In schools of the general type the income from this source is relatively small.[4] On the other hand, the sales of products of the soil are especially high in centres of agricultural training;[5]

Sale of articles made by the students in vocational and technical training schools, the income

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1. The increased percentage is due to the development of various types of schools. The amount of the quota paid by the families is determined on the basis of the family income and is paid into the budget of the local executive unit.
2. Sharing in the costs of Pioneer camps.
3. Sharing in the costs of pre-school instruction.
4. The village school of Nukedi in the Kubinsky district (raïon) of Azerbaijan had an average annual income of 600 roubles from the sale of potatoes raised on the school grounds, and some schools in that vegetable-raising area profited by larger crops.
5. These were evaluated by the USSR Ministry of Agriculture at 12 million roubles, a part of which was paid as compensation to the students.

being divided between the students[1] and the school (for the improvement of teaching facilities);

Receipts from performances organized by certain specialized institutions (conservatories, etc.).

It will also be noted that a large part of the funds for university research laboratories comes from contracts concluded with industrial, agricultural and other enterprises. However, the expense of such laboratories is not, strictly speaking, an educational expenditure.

Furthermore, besides their participation in educational activities already mentioned, the state enterprises and co-operatives directly finance other expenditures for purposes of education and training: (a) construction of schools for general instruction by the 'kolkhozy' (see table 54 of the Soviet authors' study); (b) financing of scholarships by the enterprises for their personnel; (c) creation of educational centres more or less entirely supported by the enterprises, including adult education centres for completion of schooling up to grade 8 and technical and agricultural higher training centres called respectively 'workshops-VTUZ' and 'sovkhozes-VUZ'[2] ; (d) payment of salaries during the extra time off granted to students taking correspondence or evening courses in order to enable them to attend practical exercise sessions and undergo examinations; (e) expenses of training and advanced courses for workers in the enterprises.[3]

The sum of the expenditures made by the enterprises and co-operatives would certainly increase in far from negligible proportions the total expenditures shown in table 50 and following tables, which do not include such expenditures.

3. The distribution of funds from the single State budget between the Union budget (5.7 per cent of the total State budget), the budgets of the republics (30.1 per cent) and the regional and local budgets (64.2 per cent) confirms what we have already indicated concerning the decentralization of the administration of the schools and other educational institutions: the federal ministries only control directly a very small number of institutions, the essential part of the administrative duties being carried out by the republics, and especially by the regions, districts and towns or cities.

B. CENTRALIZATION OF FINANCING AND QUANTITATIVE AND QUALITATIVE EQUALIZATION OF THE DEVELOPMENT OF EDUCATION IN THE VARIOUS USSR REPUBLICS

As has just been said, the basic financing of educational institutions - and this applies particularly to the general schools - is provided by the single State budget. The budgets of the republics and of all regional and local sub-divisions - for education as for other public services - are integral parts of that single budget, which is voted each year by the Supreme Soviet of the USSR; in other words, the financing of education in the Soviet federal State is still highly centralized. We should like to shed light upon the advantages of that system as an equalizer of educational development in all the different regions of the Soviet Union.

The budget of each republic is fed directly by a certain number of revenues which are assigned to it in full, but the amount of the funds of that type varies according to the republic and at all events they are not sufficient to cover the entire financing of the budgets of the republics as well as the regional and local budgets. The necessary additional receipts are provided by a percentage of the tax paid by the enterprises on their total output or 'volume of business' - a percentage which the Ministry of Finance of the USSR authorizes to be held for assignment to the individual republics.

The product of this tax varies, however, according to the wealth, the degree of industrialization and the nature of the industries of each of the republics. The levy assessed for the benefit of the republics is therefore not at all uniform (it varies from year to year: an average of 30 per cent for the RSFSR and the Ukraine, but 80 per cent in Transcaucasia). Some of the republics in Central Asia are even authorized to retain the entire amount of the tax, without that being sufficient to balance their budgets. In such cases, the Union assigns them an additional subsidy drawn from its own receipts.

This system, which has been applied in a general way since the inception of the Societ régime, amounts to a transfer of financial resources from the more developed republics towards the others, and it has ensured each of them - regardless of its comparative level of economic development - practically equal opportunities for the development of collective services of all kinds, such as health, culture, and the like.

In the field of education, that comparative equality is to be found both quantitatively and qualitatively.

From the quantitative point of view, for example, tables 39 and 40 of the Soviet authors' study on the development of higher education and secondary specialized education (number of students per 10,000 inhabitants) in each of the fifteen Soviet republics show that the large differences in relation to the general average which still existed in 1940 were greatly attenuated in 1963/64.

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[1] An apprentice training centre which the mission visited in Moscow distributed one-third of the receipts to its students.

[2] See p.67 and following of the Soviet authors' study.

[3] See Part Two, chapter 3, of the Soviet authors' study.

From the qualitative point of view, we note that the costs per pupil in the general schooling system - which constitute fairly valid comparative criteria of the quality of the instruction - vary relatively little from one republic to another. This homogeneity of costs is explained, on the one hand, by the effort made to plan the school system and utilize it in a rational manner,[1] and on the other hand by the application of identical qualitative norms to all of the republics for the recruiting and remuneration of the teaching staff, expenditures for school equipment, etc.

In short, this relative uniformity of the quantitative and qualitative development of the general educational system throughout the vast territory of the USSR has only been possible - considering the variations which still exist in the level of development of the different republics - through the transfers of financial resources effected through the medium of the single State budget.

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[1] See p.105-106 of the Soviet authors' study.

Section II AMOUNT OF EDUCATIONAL EXPENDITURE AND CHOICE OF PRIORITIES

A. BASIC ROLE OF UNIT COSTS IN FINANCIAL EVALUATIONS OF THE PLAN AND DETERMINATION OF ANNUAL BUDGETS. RECENT TRENDS

The allocation of funds for education, determined within the context of a five-year plan, depends on two variable factors: the enrolment targets at all levels and the applicable cost standards, which can be synthesized in the 'unit costs' per pupil, or student.

The product of these two variables is assessed, taking into account the over-all forecast of expenditures for other sectors, in the general picture of the 'financial balances' referred to on page 235 in chapter 1 of this report.

The unit costs to be used throughout a five-year plan are established by the USSR Gosplan in conjunction with the Ministry of Finance and the other appropriate ministries and research institutes. These norms constitute, to some extent, variables on which the final decisions of the plan will rest, and a particular point is, as will be brought out in 'B' of this section, that the Soviet planner has possibilities of substitution (full-time or part-time instruction, pupil/teacher ratios, etc.).

Contrary to the unit cost trends in industry, which decrease with the improvement of production methods, unit costs per full-time pupil tend, in general, to increase during a five-year plan under the effects of the improvement of teacher remuneration and of the pupil/teacher ratio, better methods of instruction, etc., although, owing to the unavoidable financial limitations, the norms finally decided upon to serve as a basis for the five-year plan do not always correspond entirely to those which the respective ministries consider desirable.

Costs are defined by type of school, and, in the case of general education, by whether the school is urban or rural.[1] They are determined by means of detailed analysis and the highest possible degree of standardization[2] of all factors entering into the total cost per pupil, an analysis of which an accurate example concerning specialized secondary schools will be found on page 169 and following pages of the Soviet authors' study.

The IIEP mission wishes to draw the special attention of the educational administrators and financing specialists of all countries to the great value of these methods of analysis, standardization and forecasting for the planning of operating expenses - a type of planning which has still too often remained in an embryonic stage.

Table 9, drawn up on the basis of financial data given in the Soviet authors' study, shows average costs per pupil or student (operating expenses) for each of the chief levels of instruction for the years 1960 and 1964.

On the whole, it can be said that the average costs per pupil or student have remained substantially unchanged, except for the increase in the

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[1] There are certain disparities in costs between rural schools and town or city schools, especially owing to variations in the average pupil/teacher ratio.

[2] Page 168 of the Soviet authors' study gives examples of norms applied as student/teacher ratios in the different types of universities and other institutions of higher education.

Table 9. Average costs per pupil by type of school (operating expenses, in new roubles)

Types of school	1960			1964		
	Total expend-iture(a)	Number of pupils(b)	Cost per pupil(c)	Total expend-iture(a)	Number of pupils(b)	Cost per pupil(c)
Day nurseries and kindergartens	1 371	3 115	440	2 254	5 496	410
Children's homes and boarding schools for handicapped children	269	136	—	291	245	—
General educational schools	3 169	36 187	88	4 603	46 664	99
Of which: Schools for adults or adolescents past compulsory school age	175	2 770	63	297	4 656	64
Vocational training centres	502	1 113	451	663	1 607	413
Secondary specialized schools	466	2 060	(d) 226	635	3 326	(d) 191
Higher educational institutions	1 000	2 396	(d) 417	1 267	3608	(d) 351

a. In millions of roubles. Source: Table 50 of the Soviet authors' study

b. In thousands. Source: Narodnoe khozyaistvo SSSR v 1964 godu, p.667, 668, 676, Moscow, 1965

c. In roubles. These costs include all the sources of financing which enter into table 50 of the Soviet authors' study

d. These costs represent an average between full-time instruction and part-time instruction; the average budget/unit costs per type of instruction were estimated in 1959 approximately as follows (in roubles):
Secondary specialized education: day, 447; evening, 111; correspondence, 52
Higher education: day, 1,058; evening, 290; correspondence, 81

Table 10. Annual costs of operating expenses per pupil or student in schools and institutions visited by the mission (a)

Schools and institutions visited	Annual costs (in roubles)
Boarding school in Azerbaijan	600
Kindergarten in Azerbaijan	360
Of which: Parents pay a part (b)	60
Secondary schools in Azerbaijan	100
Boarding school in Moscow	540
Of which: Parents pay a maximum quota (b)	120
Technicum in Azerbaijan (separate departments for day and evening courses)	344
Vocational and technical training centre in Azerbaijan	350
Technical institute in Azerbaijan ('Zavod-VTUZ')	450 (c)
Special mathematics school, Novosibirsk	1 500 - 2 000
Of which: Maximum quota is paid by parents (b)	506
VUZ for music (National Conservatory of music)	6 000
National technicum (music teaching)	3 000

a. From notes taken by members of the mission

b. The quota to be paid by the parents is established on the basis of their earnings: as a rule, when the family income exceeds 60 roubles per month per person, the maximum rate is applicable, but it is in all cases much lower than the real cost

c. Not including services, etc., supplied by the enterprise which gives aid to VUZ. Without this aid the cost would normally amount to 800-900 roubles

cost of secondary general education owing to the rise in teachers' salaries resulting from the decision of 1964. The apparent variations for other levels of instruction can each be explained by special reasons:

1. The costs of pre-school instruction are still extremely high in proportion to costs of primary and secondary schooling. [1] The slight drop in the cost between 1960 and 1964 is due to the fact that some of the new nursery schools or kindergartens established during that period were open only nine hours per day (instead of twelve hours).
2. The apparent decline in average costs per student in the specialist training schools is at least partly explained by the increased percentage of part-time students (evening and correspondence courses) recorded between 1960 and 1964. (See table 45 of the Soviet authors' study.) Considering the large differences in average budget costs between the various kinds of instruction (see note 'd' in table 9), the constantly increasing amount of part-time instruction

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[1] These high costs are explained both by the small number of pupils per class (a maximum of twenty-five) and the exceptional size of the staff. For example, the full-time staff of a four-group kindergarten (100 pupils) visited by the mission at Moscow included one director, one housekeeper, eight teachers (women), one music teacher, one laundress, one nurse, four maids and one watchman or janitor. The number of teachers results from the fact that this kindergarten is open twelve hours per day (from 7 a.m. to 7 p.m.) in order to allow the mothers to work, and two teachers must therefore succeed each other in each classroom.

reduces the average cost - without there being a real decrease in costs - for each method of instruction.

The costs shown in table 9 constitute, of course, general averages per major level of education. In fact, very large differences in costs are found within the same category of institutions (e.g., universities and secondary specialized schools) according to the purpose of the instruction - a fact which is brought out in table 10.

The table shows the per-pupil costs furnished to the mission on its visits to the schools (year 1965). Considerable similarity with the average costs is noted in so far as general education and vocational training are concerned. On the other hand, large variations appear in the case of certain institutions (e.g., the mathematics schools of Novosibirsk and music schools), these exceptional costs being explained by a particularly high teacher/student ratio and by boarding school costs.

For purely documentary purposes, table 11 shows the rates of remuneration for teachers furnished to the mission on its visits to schools in the RSFSR and the Azerbaijan SSR. Table 12 shows the scholarship rates paid in the universities and other institutions at the higher level and also in the secondary specialized schools.

Table 11. Salaries of teaching staff of schools and institutions visited by the mission (a)

Schools and institutions visited	Monthly salary (in roubles)
Boarding school in Moscow:	
Average for teachers	130 - 140
Technicum in Moscow:	
Average for teachers	120 - 200
Associate directors	165 (b)
Director	350 (c)
Vocational training centre in Moscow:	
Average for teachers	110 - 135
Professors of music at the National Conservatory	400
Professor at the University of Novosibirsk	500
Lecturer at the University of Novosibirsk	280 - 320
Professor at the University of Azerbaijan	400 - 500
Lecturer at the University of Azerbaijan	270 - 320
Assistant in the University of Azerbaijan	170 - 280
Dean of faculty	Professors' salary +35%

a. From notes taken by members of the mission
b. This figure may be increased by allowances for courses taught by the assistant director up to a maximum of 480 hours per annum
c. This figure includes allowances for courses taught

Table 12. Monthly rates of scholarship awards to students in higher and secondary specialized institutions (a)

	Monthly rate of awards (in roubles)
Higher education	
Basic rate:	
Years 1 to 4	28
Fourth year (if final) and fifth and sixth years	33
Increase for certain types of studies (technical, agronomic, legal, physical education, foreign trade, interpreting, Far North, etc.)	7
Basic rate in pedagogical institutes	35
Students in teacher-training schools	40
Students specializing in the teaching of retarded children	
Students sent by enterprises (b) (regular students' rate increased 15 per cent)	
Increase for excellent marks (c): 25 per cent	
Secondary specialized education	
General basic rate (all years)	20
Students sent by enterprises (b) (regular students' rate increased 15 per cent)	
Increase for excellent marks (c): 25 per cent	

a. On the average, 72 per cent of the students receive state scholarships and 15 per cent receive them from enterprises. When there are too many candidates, a committee in each institution selects those who are to receive the awards. Allowing for the average percentage of scholarship students indicated above, the candidates whose parents have the larger incomes are refused, but the award of a scholarship does not appear to depend entirely on a fixed level of family income determined by all institutions
b. Scholarship paid by enterprises
c. Rating '5' in all or nearly all subjects

B. ALLOCATION OF FUNDS EARMARKED FOR EDUCATION AND CHOICE OF PRIORITIES UNDER THE PLAN

It is impossible, within the short duration of a plan, to carry out or even to undertake all the actions which seem to be immediately useful for improving the level of culture, the well-being and the standard of living of a population. Like all other countries, the Soviet Union has felt that limitation. The very essence of the work of planning is to make choices between the possible different uses of national funds and to try to give the maximum rationality to these necessary choices.

The major Soviet planning choices rest to a large extent on options previously laid down by the political authorities - and that is especially true in the field of education. However, these choices cannot be seriously formulated and later put into concrete terms without an over-all vision of requirements and resources, and that over-all view cannot be obtained otherwise than from the deliberations of the higher planning authorities and especially as a result of the economic and financial 'balances' established by the 'horizontal' or 'synthesizing' departments of the USSR Gosplan.

It was not the purpose of the IIEP mission to go deeply into the problem of the major choices in the Soviet plan; that is to say, on the one hand, the choice of the respective portions devoted to investment (the formation of fixed capital)[1] and consumption, and on the other hand the sharing of investments between the sectors of production and of collective services (education, health, housing, etc.).

By the same token, the mission was not called upon to discuss in a definite way, with the aid of statistical data, the methods of distributing funds between the different forms of collective investment. In this connexion, the work of the Soviet planners seemed to us to be facilitated by the establishment of 'norms' applicable to the different sectors. The respective degree of coverage of the requirements in comparison with these norms clarifies the definite decisions which must be taken in the final showdown between requirements and available funds.

1. Priority given to educational development in the Soviet plans

At all echelons of the Soviet administrative hierarchy, including the Gosplan, the members of the mission were told that 'the needs of the cultural sector (education, research, culture, etc.) enjoy priority and have always been particularly well satisfied in comparison with other sectors'.

Economists and financiers very often told us, 'We make it a principle not to haggle over funds for education'. But just what does that priority amount to?

In judging that priority, one can refer to the various criteria by means of which the magnitude of the effort made in favour of education may be measured.

Quantitative importance of results already obtained and of targets for the future. The extremely positive balance of the quantitative development of education in the USSR since the first five-year plan (1928-32 inclusive) and the ambitious nature of the general targets of the eighth plan (1966-70) or the '1980 targets'[2] clearly show that Soviet planners have always given a leading place to the problems involved in the formation of 'human capital'.

'Qualitative' conditions of the operation of the educational service. The 'quantitative' development of schooling has been accompanied by a constant effort to improve the 'qualitative norms' of the instruction, which are a determining factor in the costs (pupil/teacher ratio, training of the teaching staff, equipment of schools and institutions, social aid to pupils and students, etc.). The members of the mission were able to note the efforts which have been made in all these fields during their direct contact with the schools and other educational institutions.

The amount of educational expenditure in relation to the aggregates of national accounting. One of the criteria which, in the final analysis, enables the effort made by the Soviet planners on behalf of education to be most easily and most objectively appraised is provided by the total amount of educational expenditure in proportion to the aggregates of the national accounts. However, comparisons in this field with other industrialized countries meet with statistical and technical difficulties which are hard to overcome, as we shall see.

Table 13 shows the trend from 1950 to 1964 of the proportion of the total expenditures for education (from the state budget and other sources) to the net material product of the USSR.

However, the concept of 'net material product' (NMP) on which the Soviet estimates are based does not correspond to the national accounting system of the United Nations adopted by most of the western countries[3] and no comparison of the percentages of Soviet educational expenditure in proportion to the 'net material product' can be made with the corresponding percentages of western countries calculated in proportion to their 'national product'.

Nevertheless, in an effort to establish a basis of comparison, we can refer to the estimates of the Soviet gross national product (GNP) calculated (in millions of old roubles) for the years 1959 to 1962, according to United Nations standards by the American economist, A.S. Becker. On the basis of these estimates, the Soviet educational expenditures shown in table 13 would represent the percentages of the GNP as in table 14.

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[1] The Soviet investment rate is particularly high (about 25 per cent).

[2] See chapter 6 of the Soviet authors' study, and chapter 3 of this report.

[3] In particular, the Soviet 'material product', unlike the national product or domestic product concept, does not take into account economic activities which do not contribute directly to production (public administrations, national defence services, personal services, etc.). The resulting difference is approximately 20 to 23 per cent less than evaluations made on the basis of the United Nations system.

Table 13. Trend of the total expenditures for education in proportion to the net material product (NMP) of the Soviet Union from 1950 to 1964 (in millions of old roubles)

Year	NMP(a)	Educational expenditures(b)		Percentage of NMP	
		Total(c)	Capital(c)	Total expenditure	Capital expenditure
				%	%
1950	?	53.2	—	?	—
1953	(d) 750	(e) 57.2	—	7.20	—
1955	(d) 940	(f) 62.6	—	6.34	—
1959	(c) 1 362	77.5	8.10	5.70	0.60
1960	(c) 1 450	83.8	11.48	5.77	0.79
1961	(c) 1 529	91.6	12.70	5.97	0.83
1962	(c) 1 646	100.5	13.50	6.10	0.82
1964	(c) 1 815	117.2	14.58	6.45	0.81

a. Source. United Nations statistical yearbook

b. Sources

From 1950 to 1959: evaluation of general expenditures made by H.J. Noah (Financing Soviet schools, Teachers College Press, Columbia University, 1966)

In 1961 and 1962: statistical surveys of educational expenditure by Unesco

In 1960 and 1964: tables 50-52 of the Soviet authors' study, closely following the model of the Unesco survey

c. At current prices

d. At 1960 prices

e. Equivalent to about 54,000 million at 1960 prices; the percentage of the NMP is based on this estimate

f. Equivalent to about 59,600 million at 1960 prices; the percentage of the NMP is based on this estimate

Table 14. Educational expenditures in the USSR (in percentage of GNP)

Year	GNP(a)	Percentage of GNP		
		Operating expenses	Capital expenditure	Total
1959	1 677	4.11	0.49	4.60
1960	1 794	4.07	0.63	4.70
1961	1 848	4.26	0.68	4.94
1962	1 994	4.37	0.68	5.05

a. Estimate of the Soviet gross national product according to the national accounting system of the United Nations by A.S. Becker: Soviet national income and product, 1958-62, Santa Monica, Rand Corporation, 1966

The above data show that the total educational expenditures[1] (from the state budget, amounts paid by the families, and contributions from various agencies) was more than 7 per cent of the NMP at the beginning of the 1950s, that this proportion decreased until 1959 (4.70 per cent)[2] and then gradually increased to reach 6.45 per cent in 1964. If these percentages of educational expenditure are considered in proportion to the GNP (as evaluated by A.S. Becker), we find that they increase from 4.60 per cent in 1959 to 5.05 per cent in 1962. Considering the ratio between the Soviet NMP and its GNP to be more or less constant (a difference of 20 to 23 per cent), the percentage of the GNP devoted to education for 1953 should be about 6 per cent and for 1964 about 5.3 or 5.4 per cent.

If we may compare these figures with those which are known for other industrialized countries, the result is that at the beginning of the 1950s the expenditure for education in the USSR came near to being 6 per cent of the GNP of that country (calculated according to the United Nations norms), while the United States was still devoting only 3.44 per cent of its GNP in 1950 to education and most of the Western European countries less than 3 per cent.[3] In other words, at the time of the fifth plan the USSR financial effort for education greatly exceeded and in some cases doubled the effort made by the western countries.

Later, the effort of the western countries developed quite rapidly,[3] but in 1964 the level of the educational expenditure of the USSR was still very near to that of the United States and was still higher than that of the majority of the countries of Western Europe.

We do not conceal all the hazards and uncertainties which affect the validity of such comparisons. In particular, the evaluations for the USSR include a large amount of expenditure for scholarships and for food (23 per cent in 1960 and in 1964)[4] which has no equivalent in any of the other countries we have mentioned and is open to question, in part, as to whether it is really an educational expense.[5] Inversely, we have said that the inventory of educational expenditure shown in the Soviet authors' study excluded certain expenses for education borne by the families and especially by enterprises, co-operatives, etc., which are relatively important but difficult to evaluate.[6]

With these reservations, it must be admitted, in short, that the scale of expenditure for education in the USSR is at present on a par with that of the most advanced industrialized western countries, but that the USSR was far in advance of these

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1. As stated in the notes to table 13, we have been obliged to use two different sources, successively, but the estimates by H.J. Noah and the following ones seem to us to be sufficiently homogeneous.
2. This lower figure can be explained particularly by the children born in the low birth-rate years starting in 1941 reaching school age.
3. See Raymond Poignant, L'enseignement dans les pays du Marché commun, p. 250, Paris, Institut pédagogique national, 1965.
4. Table 52 of the Soviet authors' study.
5. This consists, in part, of expenses for food, clothing and lodging of pupils or students - expenses which in the other countries are borne to a great extent by the families and are not included in evaluations of educational expenditures.
6. This is often the case in other countries.

countries, in general, during the 1950s. It therefore appears that, on the average, the USSR has given to the financing of education during the last fifteen years a higher priority than has been given by the western countries.

2. Still limited priority in favour of education

In spite of the high level of educational expenditure attained in the USSR by 1950 and maintained almost constant up to the present time, the Soviet planners have never claimed to have fully satisfied, even now, all educational needs, either from the point of scholastic targets in certain types of institutions or even from the viewpoint of the conditions of the teaching work.

The mission was told at all times that the 'favourable treatment' accorded to education was of course that which came 'within the limits of the economic possibilities'.

The Soviet authorities, like those of all other countries, are obliged either to limit their objectives temporarily, however desirable they may be, or, without reducing quantitative targets, to seek or to continue the least costly solutions in order to attain these targets. The IIEP mission was given the opportunity to observe cases of these actions, some of which are summarized hereunder.

a. Limitation of desirable targets

This has occurred particularly in the case of kindergartens and boarding schools.

Over and above the instructional role of these two types of institutions, they have a very important social and economic role. For this reason, the Soviet authorities have made a very special effort on behalf of these institutions during the last few years, but the results are still far from meeting the needs.

As a matter of fact, those two types of schooling are extremely expensive, both in investment costs and in operational expense (see 'A' above in this section) and, considering the requirements of other sectors, annual budget limitations did not allow any more to be done. However, the targets of the eighth five-year plan (1966-70 inclusive) will tend to bring the supply closer to the demand in those two fields.[1]

b. Seeking or maintaining the least expensive solutions

Continuation of double sessions in the eight-and ten-year school systems. Although the Supreme Soviet, in article 10 of its law of 24 December 1958, invited the government to take all necessary measures to eliminate the 'double-session' classes (two attendance groups) by 1965, 30 per cent of the children in the eight-year and ten-year cycles still attended the afternoon session; in spite of the quite vigorous denunciation of the unquestionable pedagogical drawbacks of this system by the ministers of education, the double-session school schedules cannot be entirely eliminated, though the 1966-70 plan provides measures to improve this situation.

Choice between vocational and technical training by school or by factory. The training provided in trade and technical schools to produce skilled workers is, on the whole, more expensive than the training provided in the factories themselves. Thus, the development of such schools was restricted for a long period of time, during which the factories and other enterprises continued to be essentially responsible for the training of manpower.

The trend of this problem is now developing in line with the arguments of those who, after studying the problem (see section III hereunder), maintain that the training given in schools pays best in the long run. A sizeable increase has in fact been noted in the enrolment figures of trade and technical schools for the last few years (see tables 22 and 23 of the Soviet authors' study) and that increase will continue during the remainder of the eighth five-year plan.

Choice between full-time instruction and evening school or correspondence instruction. In principle, the numbers to be admitted to higher educational institutions and technicums are determined in accordance with the requirements of the economy, and on that basis the economists of the planning agencies must respect those targets, which constitute one of the necessary conditions for the pursuit of the economic expansion. However, specialist training can be accomplished under different conditions from the standpoint of cost: by daytime, evening, or correspondence courses (see 'A' above in the section).

There are undoubtedly other considerations[2] which help to explain the rapid development of part-time instruction since the period immediately after the war, but the concern for finding 'the most economical solution' has also been a factor in the distribution among the three forms of instruction.

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[1] The total enrolment in kindergartens and nursery schools had already reached 6,782,000 children for 1966/67, as compared with 4,813,000 in 1963/64.

[2] The development of instruction in evening courses and by correspondence is also explained by the desire to: (a) provide an opportunity for workers to continue their studies and become 'specialists' (possibilities of promotion); (b) combine vocational activities with study; (c) have boys and girls, by taking evening courses, participate sooner in the responsibilities of social and economic life; however, with the generalization of the ten-year schooling system, the opposite tendency is observed - at least in boys and girls of school age.

Moreover, the manpower planning agencies are also interested in these choices because the results of the manpower 'balances' may bring out the necessity of keeping 'on production' a large part of the students of the higher educational institutions and technicums. That same factor may also count at the level of grades 9 and 10 in the complete secondary schools (choice between the normal type of instruction and the schools for young peasants and workers), but we have already said (chapter 3) that this does not seem to have had a real effect.

It was not possible for the IIEP mission to attempt to weigh the respective roles of the different factors (financial, social and economic) in the final choice among the three possible forms of instruction which follow the compulsory eight years of schooling or the complete secondary schooling.

At all events, the very strong trend which has led to the attempt, during the past fifteen years, to provide a constantly increasing part of specialist training by part-time instruction appears today to have slowed down considerably. The apparent immediate financial savings are being weighed against the real costs of part-time types of instruction and, for certain types of training, their pedagogical disadvantages (see section III hereunder). The policy is clearly directed today towards a distribution of students among the three forms of instruction based, to a greater extent than in the past, on pedagogical and social considerations.[1]

This choice among the various possible forms of instruction, considering the different factors concerned, constitutes one of the most original aspects of the work of the Soviet planners and it is an example which should be carefully considered by other countries.

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[1] See in this connexion p. 154 and following of the Soviet authors' study.

Section III DEVELOPMENT OF STUDY AND RESEARCH ON THE ECONOMIC ASPECTS OF EDUCATION

The role of general education and of vocational and technical training as factors of development of the individual productivity of the workers and, from a macro-economic point of view, of the increase of the national income, was brought out at a very early date by Soviet economists, in particular by the first works of Professor Stanislav Strumilin published in the 1920s. Since then, Professor Strumilin and other economists have developed that line of study, which relates to what could be called the 'external efficiency' of the educational system.

In the USSR, as in other countries, the last word has not yet been written on this subject. In regard to methods of quantitative measurement of the economic return on educational expenditure, in particular, discussion is still wide open, as is also the field for new research.

Studies on the extent to which education in the USSR pays dividends have become more diversified in the last few years in the direction of the comparisons which economists and educators are quite naturally led to establish between the respective results of the different forms or processes of education and training: Full-time education or instruction without terminating production (by evening courses or by correspondence)? Vocational training by school or in the factory? Vocational training after eight years of schooling or after ten years of schooling?

As is explained at length in the Soviet authors' study, the very close link which the Soviet planners establish between educational development and manpower requirements tends in itself to maximize the efficiency of the national education system in proportion to economic growth. However, as we pointed out in chapter 3, aside from the inevitable uncertainties which characterize long-term manpower forecasts and which justify in themselves a deeper consideration and control of the experience acquired from appropriate study and research, Soviet planners are obliged to face increasingly precise questions, including those concerning the content and the level of training which manpower should receive so as to be able to adapt themselves to changing methods of production and to the mobility of employment which inevitably results. In this field also, the efforts undertaken must be further developed. (See Part One of the Soviet authors' study.)

Lastly, if we consider the 'internal efficiency' or payability of the educational system, many points of major importance are still subject to discussion and call for further research - optimum size of classes, comparative value of teaching methods, comparative value of school curricula, training level of teachers, etc. - the results of which condition educational costs and expenditures, and hence certain options in educational planning.

For all these reasons, a large effort of thought, study and research has been developed in the last few years in the USSR concerning the numerous problems which are summarized today in the expression 'economic aspects of education'. This effort is of concern to the institutions of a strictly pedagogical nature (Academy of Pedagogical Sciences, advanced pedagogical institutes, etc.), as well as to economists and planners (economics faculties of universities, research institutes, the Gosplan, ministries and state committees responsible for education, etc.).

A. CONFERENCE OF SEPTEMBER 1964 ON CO-ORDINATION OF ECONOMIC ASPECTS OF EDUCATION THE SUBJECTS FOR RESEARCH RECOMMENDED

The necessity of encouraging, developing and co-ordinating all this research induced the Lenin Pedagogical Institute in Moscow to organize in September 1964 a conference at its Educational Economics Laboratory, bringing together more than sixty specialists representing the universities and advanced pedagogical institutes, research institutes, the USSR Ministry of Higher and Secondary Specialized Education, the USSR Gosplan, etc.

The various papers presented at the conference were grouped under three major headings: general problems of the economics of education, general training and workers' output, and problems of national educational planning. They were published in a volume entitled 'Current Questions in the Economics of Education.'[1] This publication provides an important synthesis of the trends of Soviet research in those fields and of the content of the studies in progress or their results.

The conference concluded its work with recommendations providing guidelines for studies to be further pursued, couched in definite terms by a list of subjects for research classified under five major themes:

Theme 1. The economy and national education
Theme 2. National education and manpower production
Theme 3. The economic output of national education
Theme 4. Planning of national education
Theme 5. The economics of education abroad.

The conference has already inspired the formation of specialized research groups in higher educational institutions of a number of the republics and renewed development of Soviet research in all these fields is to be expected.

B. EXAMPLES OF STUDIES ON EDUCATIONAL OUTPUT IN ECONOMIC TERMS

During its visit, the mission contacted a number of Soviet researchers who were working on the economic aspects of education. That was particularly the case on the occasion of the visit to the Educational Economics Laboratory of the Lenin Pedagogical Institute in Moscow.[2]

By way of example, a few of the research subjects which were mentioned to the mission, concerning the economic efficiency of education, are summarized hereunder:

The comparative output of full-time and of part-time studies. Mrs. I. Samoilova[3] undertook a study on the comparative output of the training of specialists by day, evening, and correspondence courses. The study was conducted by samplings of students and specialists at work.

As regards the student samplings, the average age of the students taking correspondence courses was 25.5 years in 1964/65, as compared with 22.6 years for the students in evening courses and 20.7 years for students taking day courses. Moreover, the drop-out rate in proportion to the number of admissions was much higher among part-time students than among day students.

As regards the professional career of the specialists trained, not only do the full-time students complete their studies sooner and thus have a longer active career - as specialists - but in general they also occupy higher positions.

According to Professor Zhamin, more tasks of this kind should be carried out in order to deter-

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1. V.A. Zhamin, *Aktualnye voprosy ekonomiki narodnogo obrazovaniya*, Moscow, 1965.
2. The mission also had a very interesting interview with Professor Yagodkin of the College of Economics of the University of Moscow, concerning the work of his group of research specialists in the field of the economic efficiency of the training of workers in connexion with problems of occupational mobility and change, but we are unable to include an account of it in this report.
3. The previously mentioned work edited by V.A. Zhamin contains an article by Mrs. Samoilova in which she gives some of the results of her research.

mine more accurately than heretofore the place which part-time training should have in the preparation of different kinds of specialists.

The importance of general training in the productivity of the workers. This subject was approached in 1924 by Professor Strumilin. Many other studies have now been carried out in this field.

In particular, a methodological study bearing upon 3,000 Moscow workers was directed by Mr. Kaplan, head of the Educational Economics Laboratory of the Lenin Pedagogical Institute. The inquiry was intended to determine the relationships between the amount of general schooling received and certain aspects of the professional career. It showed that an average worker having four years of experience with qualification rating 3 and having a general schooling of nine to ten years has a productivity level 25 to 30 per cent higher than one who went to school for only five or six years.[1] Moreover, 25 per cent of the workers in the first category offer suggestions for more efficient operation, contrasting with only 5 per cent of the second category.

A study of the qualifications (years of general schooling) and the respective outputs of the workers of two different textile factories resulted in identical findings with respect to the ratio between the amount of general schooling and the productive output of the workers. The positive part played by a longer general schooling has been analysed by other investigators on the basis of different criteria: reduction in the length of vocational training, more rapid promotion to the higher levels (ratings 5 and 6) of the worker classification, etc.

These consistent results justify, from the standpoint of profitable economic output alone, the implementation of the universal ten years of schooling system, which is scheduled to begin early in the 1970s.

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[1] Similar observations were made in a study by Professor E. Pysina (Ural State University) of workers in a metallurgical factory at Pervuralsk.

Annex I

List of members of the IIEP mission to the USSR

Head of mission

Raymond Poignant France	Senior Staff Member of the *International Institute* for Educational Planning, Paris

Members

Hellmut Becker Federal Republic of Germany	Director of the Max Planck Society Institute for Educational Research, Berlin
Warren W. Eason United States of America	Professor of economics and Head of the Department of Soviet Studies, Syracuse University
Bouzid Hammiche Algeria	Assistant Director of School Organization and Planning, Ministry of Education, Algiers
Michael Kaser United Kingdom	Professor of Soviet Economy at Oxford University, and Fellow of St. Anthony's College, Oxford
Philippe Madinier France	Chief of Mission for the General Commission of the Plan, Paris
M.V. Mathur India	Member of the Indian Education Commission, New Delhi
Kenneth Matiba Kenya	Permanent Secretary, Ministry of the Interior, Nairobi
J.K. Njoroge Kenya	Permanent Secretary, Ministry of Education, Nairobi
Georgi Skorov USSR	Senior Staff Member of the International Institute for Educational Planning, Paris
Bohgdan Suchodolski Poland	Director of the Pedagogic Institute of Warsaw University

Secretary

Anne Hollister United States of America	Consultant of the International Institute for Educational Planning, Paris

Annex II

Programme of the IIEP mission to the USSR

September 1965

Saturday 18	Arrival of mission in Moscow
Sunday 19	Tour of Moscow
Monday 20	
Morning	Meeting with Mr. A. Petrov, Vice-President of the National Commission of the USSR for Unesco Examination of the IIEP mission programme
Afternoon	Preliminary meeting with the authors of the manuscript of Educational Planning in the USSR
Tuesday 21	
Morning	Visit to kindergarten No.788
Afternoon	Interview with the Deputy-Chairman of the department of education, Moscow City Council
Wednesday 22	
Morning	Meeting of the mission to prepare the proposed programme in Azerbaidjan SSR Visit to secondary general school No.672
Afternoon	Visit to the central station for 'young technicians'
Thursday 23	
Morning	Visit to boarding school No.58
Afternoon	Interview with Mr. N.V. Alexandrov, Deputy-Minister of the Ministry of Education of the RSFSR
Evening	Visit to secondary general school for young workers No.12
Friday 24	
Morning	Visit to two secondary specialized schools with teaching in English and French (the mission was divided into two groups)
Afternoon	Visit to teacher-training school No.2
Saturday 25	
Afternoon	Visit to the Institute for Teachers' Refresher Courses Departure for Baku
Sunday 26	Boat trip to off-shore oil-drilling centre
Monday 27	
Morning	Interview with Mr. M. Mekhti-Zade, Minister of Education in Azerbaidjan SSR
Afternoon	Visit to a national secondary school
Supplementary visits	Discussion with R.A. Balayen, Vice-Chairman responsible for methods and curricula (Becker, Hammiche, Suchodolski) Discussion with Ministry of Education representatives concerned with planning and finance (Eason, Kaser, Madinier, Mathur, Matiba, Poignant, Skorov)

Tuesday 28	
Morning	Interview with Mrs. Husseynova, Vice-Chairman of the Committee of Higher and Secondary Specialized Education
Afternoon	Visit to Kirov State University. Received by Rector Aliev
Supplementary visits	(Mathur, Poignant, Skorov) Visit to Azerbaidjan Institute of Petroleum (Poignant, Skorov) Visit to school for children gifted in mathematics (Becker, Hammiche, Suchodolski) Visit to the Committee for Higher and Secondary Specialized Education (manpower planning) (Eason, Kaser, Madinier, Matiba) Visit to school No. 13 built using experimental construction plans (Becker, Hammiche, Suchodolski, Hollister) Meeting with representatives of the Academy of Sciences who are concerned with gifted children (Becker, Suchodolski, Hollister) Visit to the department of budget at the Ministry of Finance (Kaser, Matiba, Mathur) Interview with Mr. M.I. Allakhverdov, Chairman, Azerbaidjan Gosplan (Eason, Madinier)
Wednesday 29	
All day	Trip to Kuba rural district Visit to eight-year country school
Thursday 30	
Morning	Interview with Chairman of Azerbaidjan Gosplan (Eason, Kaser, Madinier, Mathur, Matiba)
Supplementary visits	Visit to the State Committee on Vocational and Technical Education (Poignant, Becker, Hammiche, Skorov, Suchodolski, Hollister)
Afternoon	Return to Moscow
Evening	Meeting of the mission (settlement of the supplementary programme requested for Moscow)
	October
Friday 1	
Morning	Visit to the Pedagogical Institute for Teaching by Correspondence
Afternoon	Visit to a commercial-economic technicum
Saturday 2	
Morning	Visit to the Lenin Pedagogical Institute
Monday 4	
Morning	Visit to Moscow Power Institute
Afternoon	Visit to the Educational Economics Laboratory at the Lenin Pedagogical Institute
Evening	Visit to the Moscow Pioneers Palace
Tuesday 5	
Morning	Interview with Mr. Marcouchewitch, Vice-President of the Academy of Pedagogical Sciences of the RSFSR, and Mr. Monoszon
Afternoon	Interview with Mr. Elyutin, Minister of higher and secondary specialized education, and Mr. Safinsky, Vice-Minister
Wednesday 6	
Morning	Visit to a vocational and technical school
Afternoon	Visit to the Committee for Vocational and Technical Education, USSR. Received by Mr. A.I. Shevchenko, Vice-President

Wednesday 6, evening	Visit to evening course institute at Likhachev automobile manufacturing plant
Thursday 7	
Morning	Visit to the Ministry of Culture
Afternoon	Visit to the University of Moscow. Received by Rector Petrovsky and Professors Roudnieva and Perov
Supplementary visit	
Morning	Interview with Chief Planning Officer, Ministry of Higher and Secondary Specialized Education (Poignant, Skorov, Madinier, Eason)
Friday 8	
Morning	Visit to Ministry of Agriculture (department of higher and secondary specialized education)
Afternoon	Meeting with Mr. Nozhko and nine associates at the National Commission of USSR for Unesco
Supplementary visit	
Morning	Meeting with Director of Academy of Pedagogical Sciences (Becker, Suchodolski)
Novosibirsk	Side trip (Eason, Hammiche, Kaser, Suchodolski)
Saturday 9	
Morning	Interview with Dr. Lavrentiev of the Academy of Sciences Visit to the Economics Laboratory, directed by Professor Aganbegian
Afternoon	Visit to the Institute of Mathematics Discussion of the application of mathematics to economics
Sunday 10	
Morning	Discussion with sociologists Shubkov and Pereviedeneew on the migration and the attitudes of young workers
Monday 11	
Morning	Discussion with Professor Solouhin, rector of the university, on new methods of organizing university studies
Afternoon	Visit to a specialized school of mathematics, physics and chemistry Discussion with the Director on recruitment of pupils, the curriculum and the methods used
Moscow	
Monday 11	
Supplementary visits	
Morning	Planning service of the Ministry of Education of the RSFSR (Poignant, Skorov) Interview with Mrs. Sucholova of the Lenin Pedagogical Institute (other mission members present in Moscow)
Afternoon	Interview with Mr. Severtsev at the National Commission of the USSR for Unesco (manuscript, Part One, chapters 2, 3, 4)
Tuesday 12	
Morning	Interview with Mr. Zhamin at the National Commission of the USSR for Unesco (manuscript, Part Two, chapter 2)
Afternoon	Interview with Mr. Yagodkin, Professor of the faculty of economics, University of Moscow
Wednesday 13	
Morning	Interview with Mr. Monoszon at the National Commission of the USSR for Unesco (manuscript, Part One, chapter 1)
Afternoon	Interview with Mr. Zabelin of Gosplan (Eason, Madinier)
Supplementary visits	Visit to the Institute of Economics of the Academy of Sciences (Mathur, Eason, Matiba, Njoroge, Madinier)

Wednesday 13, afternoon	Interview with Mr. Leontiev, chair of psycho-pedagogy at the University of Moscow
Supplementary visits	Interview with the department of economic and financial synthesis of the Gosplan (Poignant, Kaser, Skorov)
Thursday 14	
Morning Supplementary visits	Visit to the Committee for the Dissemination of Science and Cultural Knowledge (universities for the masses) (Sucholdolski, Becker, Hammiche) Visit to the Institute of Labour under the State Committee for Wages and Salaries (Eason, Madinier)
Afternoon	Interview with Mr. Nozhko at the National Commission of the USSR for Unesco (manuscript, Part Two, chapters 1, 3, 4, 5, 6)
Friday 15	
Morning	Individual preparation for the afternoon meeting
Afternoon	Mission conference at National Commission of the USSR for Unesco (to discuss the themes to be developed in the mission report)
Saturday 16	
Morning	Interview with Mr. Nozhko (editing of the manuscript) (Poignant)
Supplementary visits	Visit to a Hindu school (Mathur) Visit to the Mielnikoff School (Becker, Suchodolski)
From 16 to 18	Departure of mission members

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